

Historical Institutionalism and Defense Public Procurement:
The Case of Other Transactions Agreements

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ABSTRACT

Since the 1980s, private sector spending on Research and Development (R&D) has outpaced federal R&D spending. For example, while the Department of Defense (DoD) spent \$64 billion on R&D in fiscal year 2015, the private sector spent \$260 billion. DoD relies on the private sector to develop advanced technologies for defense requirements. However, some innovative businesses are hesitant to work with DoD because of the perceived bureaucracy of the DoD procurement system. Recognizing this problem, in 1989, Congress created a new type of non-procurement agreement for DoD called Other Transactions Agreements (OTs). OTs are excluded from most laws and regulations that govern traditional procurement agreements. OTs can be written to meet the needs of the parties and the project, enabling agreements that resemble commercial contracting. Congress has expanded OT authority, and DoD has issued OT guidance to its employees. But DoD has not used OTs as widely as expected. This is puzzling because commentators find OTs are helpful to DoD and the private sector in reducing the legal and regulatory compliance costs associated with the DoD procurement system. Using qualitative methods, and drawing on the OT and historical institutionalism literature, this study explores institutional factors that may explain why DoD has not more widely used OTs. The study relied on interviews with DoD employees and contractors. OT case studies were used to triangulate the interview findings. Potential causal mechanisms are identified to support future research of the DoD OT program using causal process tracing. The study findings are used to offer policy recommendations to support the wider use of OTs by DoD.

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GENERAL AUDIENCE ABSTRACT

Some innovative businesses are reluctant to work with the Department of Defense (DoD) due to the perceived bureaucracy of the DoD procurement system. Recognizing this problem, in 1989, Congress created a new type of non-procurement agreement for DoD called Other Transactions Agreements (OTs). Unlike traditional procurement agreements, OTs are excluded from many of the laws and regulations that reportedly deter the private sector from doing business with DoD. OTs enable agreements that more closely resemble commercial contracting. The terms and conditions of the OT can be written to meet the needs of the parties and the OT project. Thus, OTs are a flexible tool to help attract innovative businesses that would not otherwise work for DoD under traditional procurement agreements. Congress has expanded OT authority to encourage DoD to use OTs more widely. DoD has issued guidance to help its employees negotiate and administer OTs. But DoD has not used OTs as much as expected. This is puzzling because procurement and policy experts find that OTs are helpful to DoD and the private sector in reducing the legal and regulatory compliance costs often associated with the DoD procurement system. This study explores institutional and other factors that may help explain why DoD has not more widely used OTs. The study relied on interviews with DoD employees and contractors. OT case studies were used to corroborate the interview findings. The study findings are used to offer policy recommendations to support the wider use of OTs by DoD.

Dedication

In memory of:

Paul “PK” Kozemchak

Client, Colleague, Friend

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List of Abbreviations

ABCTM	Army Brigade Combat Team Modernization
ABM	Anti-Ballistic Missile
ACC	Army Contracting Command
ACO	Administrative Contracting Officer
AFRL	Air Force Research Laboratory
APA	American Psychological Association
ARPA-E	Advanced Research Project Agency–Energy
ASBCA	Armed Services Board of Contract Appeals
ASD(R&E)	Assistant Secretary of Defense for Research & Engineering
ATCG	Advanced Tools and Capabilities for Generalizable Platforms
BAA	Broad Area Announcement
BBP	Better Buying Power
BMD	Ballistic Missile Defense
BMDO	Ballistic Missile Defense Organization
BMDS	Ballistic Missile Defense System
bTBI	Blast Traumatic Brain Injury
BTO	Biological Technology Office
C4ISR	Command and Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance
C5	Consortium for Command, Control, and Communications in Cyberspace
CAS	Cost Accounting Standards
CBRN	Chemical, Biological, Radiological, Nuclear
CDR	Contract Deficiency Report
CEED	Consortium for Energy, Environment, and Demilitarization
CFC	Conceptual Framework Category
CMO	Contracts Management Office
COFC	United States Court of Federal Claims
CO (or KO)	Contracting Officer
CRADA	Cooperative Research and Development Agreement
CPO	Causal Process Observation
CPT	Causal Process Tracing
CRS	Congressional Research Service
DBB	Defense Business Board
DARPA	Defense Advanced Research Projects Agency
DAU	Defense Acquisition University
DCAA	Defense Contract Audit Agency
DCMA	Defense Contracts Management Agency
DCMO	Deputy Chief Management Officer
DFARS	Defense Federal Acquisition Regulation Supplement
DGAR	Defense Grant and Agreement Regulatory System
DHS	Department of Homeland Security
DIA	Defense Intelligence Agency
DISA	Defense Information Systems Agency

DIUx	Defense Innovation Unit Experimental
DLA	Defense Logistics Agency
DNDO	Domestic Nuclear Detection Office
DoD	Department of Defense
DOE	Department of Energy
DoDD	DoD Directive
DoDI	DoD Instruction
DoD IG	DoD Inspector General
DOT	Department of Transportation
DOTC	Defense Ordnance Technology Consortium
DPAP	Defense Procurement and Acquisition Policy
DSO	Defense Sciences Office
DTRA	Defense Threat Reduction Agency
EHA	Event History Analysis
ETD	Electronic Theses and Dissertations
EU	European Union
FAA	Federal Aviation Administration
FAR	Federal Acquisition Regulation
FCS	Future Combat Systems
FFRDC	Federally Funded Research and Development Center
FMD	Financial Management Division
FMR	Financial Management Regulation
FPDS	Federal Procurement Database System
FY	Fiscal Year
GAO	Government Accountability Office
GC	General Counsel
GAP	Generally Accepted Principles
GEO	Geosynchronous Earth Orbit
GPS	Global Positioning System
GTO	Geosynchronous Transfer Orbit
HASC	House Armed Services Committee
HCA	Head of the Contracting Activity
HHS	Department of Health and Human Sciences
HTV	Hypersonic Transport Vehicle
JPEO-CBD	Joint Program Executive Office for Chemical and Biological Defense
IED	Improvised Explosive Device
IP	Intellectual property
IRB	Institutional Review Board
ITAR	International Traffic in Arms Regulations
JCIDS	Joint Capabilities Integration Development System
JIDA	Joint Improvised-Threat Defeat Agency
JLTV	Joint Light Tactical Vehicle
JPEO-CBD	Program Executive Office for Chemical and Biological Defense
KMP	Knowledge Management Practice
KO (or CO)	Contracting Officer
LEO	Low Earth Orbit

MA	Method of Agreement
MD	Method of Difference
MDA	Missile Defense Agency
MDAP	Major Defense Acquisition Program
MIPR	Military Interdepartmental Purchase Request
NAC	National Armaments Consortium
NAMC	National Advanced Mobility Consortium
NASA	National Aeronautics and Space Administration
NAVSEA	Naval Sea Systems Command
NCMA	National Contract Management Association
NDAA	National Defense Authorization Act
NIH	National Institutes of Health
NMCARS	Navy Marine Corps Acquisition Regulation Supplement
NSC	National Spectrum Consortium
O&M	Operations and Maintenance
OEM	Original Equipment Manufacturer
OFPP	Office of Federal Procurement Policy
OMA	Operational and Maintenance Army
ONR	Office of Naval Research
OSD	Office of the Secretary of Defense
OT or OTA	Other Transactions Agreement
PARC	Principal Assistant Responsible for Contracting
PCO	Procuring Contracting Officer
PM	Program Manager
POGO	Project on Government Oversight
PPI	Public Procurement of Innovation
PSDT	Post-Structuralism Discourse Theory
R&D	Research and Development
RFP	Request for Proposals
RSGS	Robotic Servicing of Geosynchronous Satellites
RSV	Robotic Servicing Vehicle
S&T	Science and Technology
SAE	Service Acquisition Executive
SAF/ACQ	Assistant Secretary of the Air Force for Acquisition
SASC	Senate Armed Services Committee
SBIR	Small Business Innovation Research
SCO	Strategic Capabilities Office
SDI	Strategic Defense Initiative
SECDEF	Secretary of Defense
SOCOM	United States Special Operations Command
SOF	Special Operations Forces
SOSSEC	System of Systems Security Consortium
SPAWAR	Space and Naval Warfare Systems Command
SPE	Senior Procurement Executive
SSC	Space and Naval Warfare Systems Center
SSL	Space Systems/Loral

STTR	Small Business Technology Transfer
SPS/PD2	Standard Procurement System, Procurement Desktop-Defense
SVIP	Silicon Valley Innovation Program
TACOM	Tank-automotive and Armaments Command
TARDEC	Tank Automotive Research and Development Center
TPA	Traditional Procurement Agreement
TSA	Transportation Security Agency
TTO	Tactical Technology Office
UAS or UAV	Unmanned Aerial System (or Vehicle)
USAMRAA	U.S. Army Medical Material Agency
USD(A&S)	Undersecretary of Defense for Acquisition and Sustainment
USD(AT&L)	Undersecretary of Defense for Acquisition Technology & Logistics
USD(R&E)	Undersecretary of Defense for Research and Engineering
USSOCOM	United States Special Operations Command
VLC	Vertical Lift Consortium
VT	Virginia Tech
WETC	Warheads and Energetics Technology Center
WHO	World Health Organization
WHS	Washington Headquarters Services
WMD	Weapons of Mass Destruction
XS-P	Experimental Space Plane

Foreword

The National Defense Strategy (Strategy) takes notice of an increasingly complex global security environment, characterized by overt challenges to the free and open international order and the reemergence of long-term strategic competition between nations (DOD(NDS), 2018, p. 2). The pace of technology intensifies this competition. Thus, the Strategy cautions that the global security environment is “affected by rapid technological advancement and the changing character of war,” and “The drive to develop new technologies is relentless, expanding to more actors with lower barriers to entry, and moving at accelerating speed” (DOD(NDS), 2018, p. 3).

To help the United States prevail in this challenging environment, the Strategy calls for reforms in how the Department of Defense (DoD) operates, including abandoning “the current bureaucratic approach, centered on exacting thoroughness and minimizing risk above all else” (DOD(NDS), 2018, p. 2). DoD organizations must now “deliver performance at the speed of relevance” (DOD(NDS), 2018, p. 10). But this will require institutional change. “Delivering performance means that we will shed outdated management practices and structures while integrating insights from business innovation” (DOD(NDS), 2018, p. 10).

This dissertation (the study) focuses on defense public procurement. It tries to help DoD organizations to deliver performance at the speed relevance by investigating Other Transactions Agreements (OTs). OTs are a relatively new type of non-procurement agreement, now codified under 10 U.S.C. § 2371b and intended to help DoD attract innovative businesses to partner with it to develop and field new technologies for defense requirements.

In contrast to traditional procurement agreements—contracts, grants, and cooperative agreements—OTs are excluded from following most of the myriad federal laws and regulations that reportedly add unnecessary administrative cost and delay to traditional procurement

agreements, deterring many innovative businesses from doing business with DoD. OTs enable DoD organizations and the private sector to negotiate the agreement starting with a blank sheet of paper. The terms and conditions of the OT can be mutually negotiated to meet the needs of the parties and the prototype project. OTs therefore enable agreements that more closely resemble commercial contracting, making OTs a useful tool for attracting innovative businesses that would not otherwise work for DoD under traditional procurement agreements.

But even with their reported advantages, DoD has not used OTs as widely as expected. This puzzle led to the study's research question: Why, despite their reported administrative advantages, are OTs only sparingly used by DoD compared to administratively more burdensome traditional procurement agreements? Based on analysis, interpretation, and synthesis of collected data, the study offers an answer to the research question.

The study has seven chapters. Chapter 1 summarizes the defense technology ecosystem and the study's significance to the DoD OT program. The legislative history of OTs is reviewed. The chapter compares OTs to traditional procurement agreements, contrasting how they are negotiated, awarded, and administered. The research question and research hypotheses are introduced. The study's initial assumptions are outlined.

Chapter 2 discusses the prior literature relevant to the research question. Two literature topics are reviewed. The first topic is literature related to OTs. The second topic is literature related to historical institutionalism. Historical institutionalism is an established field of public policy scholarship. The study uses historical institutionalism as a theoretical lens, focusing the concepts and insights of historical institutionalism on answering the research question.

Chapter 3 is the research design and methodology. The study uses a two-phase research design and qualitative research methods. The first phase comprises qualitative interviews of

DoD employees and contractors supporting the DoD OT program and two OT case studies. The second phase comprises analysis, interpretation, and synthesis of data collected in the first phase.

Chapter 4 summarizes the results of the interviews of DoD employees and contractors supporting the DoD OT program. These interviews were conducted at DoD organizations across the nation and focused on collecting data to derive major findings for answering the research question. The chapter provides major findings for the organization interviews.

Chapter 5 summarizes the results of two OT case studies. These case studies focus on ongoing OTs in space robotics and synthetic biology—emerging technology fields vital to national defense. The case studies focus on collecting data to derive major findings for answering the research question. The chapter provides major findings for the OT case studies.

Chapter 6 uses the major findings from Chapter 5 to triangulate the major findings from Chapter 4. Consolidated major findings and potential causal mechanisms are derived. A narrative answer to the research question is provided. The consolidated major findings are interpreted and synthesized using the prior literature, collected data, and the researcher's perspectives. The initial assumptions are revisited to consider what is learned in the study.

Chapter 7 presents the study conclusions, including about future research of the DoD OT program using comparative case studies and causal process tracing. The study finishes by offering six policy recommendations that are meant to encourage the wider use of OTs by DoD. These recommendations are intended to be actionable, meaning they can be accomplished at low cost, using existing resources. DoD organizations can carry out the recommendations, thereby helping them to more widely use OTs and deliver performance at the speed of relevance.

Chapter 1–Introduction

Purpose

The study is in the field of defense public procurement and focuses on the Department of Defense (DoD) procurement system. The study investigates Other Transactions Agreements (OTs)—a relatively new type of non-procurement agreement that is intended to help DoD to attract innovative businesses and organizations to partner with it to develop advanced technologies for national defense. OTs are normally used for Research and Development (R&D) purposes, and as delimited in the study, for prototype projects.

The purpose of the study is to investigate institutional factors that may help explain why DoD has not more widely used OTs. DoD’s relatively low usage of OTs is an unsolved policy problem that has persisted for decades. The study assumes that wider use of OTs will help DoD more effectively develop advanced technologies for defense requirements. The study explores institutional factors that may have impacted DoD’s use of OTs. To find and assess potential institutional factors, the study interviewed a sample of DoD employees and contractors at DoD organizations that have recently awarded or administered OTs. The study also interviewed procurement policy officials at the Pentagon and contractors that support consortium OTs.

To triangulate the interview data, and to derive potential causal mechanisms for aiding triangulation, the study conducted two case studies of DoD programs that have ongoing OTs. The case studies were identified with the help of the study participants. The study reviews the OT literature and considers the relevant historical institutionalism literature. By analyzing,

interpreting, and synthesizing the organization interview and OT case studies findings, the study offers policy recommendations that are meant to encourage the wider use of OTs by DoD.

Definitions

Appendix A provides definitions of DoD procurement terms used in the study. For convenience, the following are definitions of DoD procurement terms used most often in the discussion and chapters that follow (32 C.F.R. Part 3, 2004; DOD(AT&L), 2017a).

- **Agreements officer:** An individual with authority to enter into, administer, or terminate OTs. To be eligible to be an agreements officer, the individual must be a warranted DoD contracting officer with an appropriate dollar value warrant. The OT literature uses the terms agreements officer and contracting officer interchangeably, and hence, so does the study.
- **Contracting agent:** A federal government organization that negotiates and awards OTs or traditional procurement agreements on behalf of DoD organizations. The contracting agent is paid an administrative fee to cover its costs for providing these services. For example, the Air Force Research Laboratory (AFRL) is a contracting agent for the Defense Advanced Research Projects Agency (DARPA).
- **Consortium Other Transactions Agreement (Consortium OT):** An OT between DoD and a consortium of contractors, typically represented by a consortium management firm. The consortium members have technical expertise in a defense technology area. A successful consortium OT is the Army's Defense Ordnance Technology Consortium (DOTC) OT.

- **Nontraditional contractor:** An entity that is not performing and has not performed, for at least the one-year period preceding the solicitation of sources by DoD for the OT, any contract or subcontract for the DoD with a value of more than \$7,500,000, or a small business. A typical nontraditional contractor is a high-tech startup company from Silicon Valley or a small business in the biotech industry in Cambridge, Massachusetts.
- **Other Transactions Agreement (OT or OTA):** An agreement between a DoD organization that has delegated authority to award OTs and one or more traditional and nontraditional contractors to carry out a prototype project. An OT is defined in the negative—an OT is an agreement that is not a traditional procurement agreement (see definition of traditional procurement agreement below).
- **Prototype project:** An OT project that is relevant to enhancing the mission effectiveness of military personnel and the supporting platforms, systems, components, or materials proposed to be acquired or developed by DoD, or to the improvement of platforms, systems, components, or materials in use by the armed forces. A typical prototype project concerns designing or building a new, militarily useful technology such as an effective Ebola vaccine or an experimental space plane.
- **Traditional contractor:** A contractor other than a nontraditional contractor. For example, Boeing and Lockheed Martin are traditional contractors.
- **Traditional Procurement Agreement (TPA):** A DoD contract, grant or cooperative agreement. An example of a traditional procurement agreement is the ongoing DoD contract to purchase the F-35 Lightning II Joint Strike Fighter from Lockheed Martin.

The discussion and chapters that follow refer to the DoD OT program. There is no formal definition of the DoD OT program. However, Chapter 2 discusses how policy scholars variously define institutions, including that an institution is a "system of human-made non-physical elements—norms, policies, organizations, and rules—exogenous to those each behavior it regulates, and that generates behavioral regularities" (Greif & Laitin, 2004, p. 635). The DoD OT program means an institution of this type. Thus, for the study, the institution of the DoD OT program encompasses the DoD organizations, qualitative documents, the participant data, and the case studies the researcher used to answer the research question and to investigate the research hypothesis presented later in this chapter.

The discussion and chapters that follow also refer to employees. As discussed in this chapter, the DoD workforce comprises several million active duty military members, National Guard and reserve military members, and civilian DoD employees. Employees is used as a shorthand term to refer to the people in this workforce, particularly employees involved in the DoD OT program.

The term traditional procurement agreements means contracts, grants, and cooperative agreements. As discussed below, traditional procurement agreements are governed by many federal laws and regulations, whereas OTs are not. But the term traditional procurement agreements does not mean contracts, grants, and cooperative agreements are otherwise the same.

As mentioned above, an OT is defined in the negative, meaning it is an agreement between DoD and one or more contractors that is not a traditional procurement agreement—contract, grant, or cooperative agreement. This is not an intuitive definition. However, a recent bid protest decision by the Government Accountability Office (GAO) helpfully explains that:

Other transactions are legally binding instruments, other than contracts, grants, or cooperative agreements that generally are not subject to federal laws and regulations applicable to procurement contracts. These instruments are used for various purposes by federal agencies that have been granted statutory authority permitting their use (GAO B-416061, 2018, p. 1).

This chapter compares OTs to traditional procurement agreements, including discussing the significant differences between how OTs and traditional procurement agreements are awarded and administered. This chapter also discusses the various purposes for OTs, including by providing an overview of the study's two OT case studies.

Background and Problem Statement

Innovation is the economic lifeblood of America. Americans pride themselves in their abilities to innovate, to imagine, and to create revolutionary technologies. Great American innovators such as Benjamin Franklin, Thomas Edison, and the Wright brothers helped shape the nation's image as a world leader in innovation. Many of the twentieth century's pivotal technological innovations—the airplane, the polio vaccine, semiconductors, the Global Positioning System (GPS), and the Internet—were products of American innovation. Modern American innovators such as Elon Musk and Bill Gates keep the flame of innovation burning in the nation's imagination. America continues to lead the world in innovation, as demonstrated by ongoing research to sequence the human genome, to understand the inner workings of the brain, to harness nuclear fusion, and to commercialize spaceflight.

The federal government is committed to creating a policy framework that promotes and continues American innovation (White House, 2015). One goal in this framework is to establish policy tools to increase the ability of federal agencies to deliver better results at a lower cost to

the American people. In a recent State of the Union address, President Obama spoke of the potential economic impact driving this goal, by proclaiming: “We know that the nation that goes all-in on innovation today will own the global economy tomorrow. This is an edge that America cannot surrender” (White House, 2015, p. 10).

The Obama Administration set a national goal to invest over three percent of the gross domestic product in public and private R&D, which would surpass the investment level achieved at the height of the space race in the 1960s. Although Congress has not fully funded this effort, it is not without fiscal substance. The United States invests more in R&D than any other nation, with about \$390 billion invested in R&D in fiscal year 2015 (White House, 2015). About one-third of this amount—\$130 billion—was invested by the federal government and the remaining two-thirds—about \$260 billion—was invested by the private sector. In fiscal year 2015, DoD invested about \$64 billion in R&D, or about half the total federal government R&D investment (GPO, 2014).

Within the federal government, DoD, with its mission to defend the nation, needs to keep a leading role in technological innovation. The pace of technology advancements by adversary and peer nations and commercial organizations drives this need. The National Science Council recently noted that adversaries have more sophisticated and effective weapons that threaten across the air, space, and cyber domains (White House, 2016). Worldwide investment in R&D is increasing at a faster pace than in the United States. Thus, the United States is no longer guaranteed leadership in all areas of science and technology critical to national security (White House, 2016). In contrast to the past, the global marketplace for advanced technology is no longer dominated by the United States. Instead, the United States now must compete with peer

nations, non-state actors, and even with commercial organizations to develop and leverage advanced technologies.

Reflecting this global trend, in recent decades, DoD has increasingly relied on the private sector to develop and deliver advanced technologies to meet national defense needs (DOD(AT&L), 2015). Although DoD spends many billions of dollars on R&D for advanced technology programs, it has encountered problems in attracting the most innovative contractors to collaborate with it to develop new technologies for national defense. DoD's inability to attract innovative contractors is not a new problem, nor, as discussed below, have Congress and policymakers ignored it. The DoD procurement system is seen as part of the problem.

A recognized shortcoming of the DoD procurement system is the myriad laws, regulations, and policies governing every aspect of the procurement process (Kelman & Schooner, 2009). Repeated attempts to streamline the DoD procurement system to make it more conducive to contracting with the private sector have had limited results (Dunn, 2009). For example, during the federal government reform movement of the 1990s concerted legislative and policy efforts were made to simplify the federal procurement system (Schooner, 1997). These efforts were spurred by the belief in the federal and private sectors that the complexity of the federal procurement system accounted for the significant cost growth and schedule delays encountered in many federal programs.

But these reform efforts did not have much success. The complexity and high costs associated with the defense procurement system continued to resist solution. An influential study in the mid-1990s put an alarming numerical focus on the problem, finding that the administrative burdens of the DoD procurement system added 18% to the overall cost of weapons systems delivered under DoD contracts (Coopers and Lybrand, D.C., 1994). From the

contractor perspective, companies often cited these burdens, and others, as reasons for avoiding doing business with the federal government (Vadiee & Garland, 2018, p. 2).

Some of these problems can be attributed to the complexity of the DoD procurement system, which reflects the size of DoD itself. DoD is a worldwide organization, rivaling nations in terms of the size of its annual budget. It is estimated that there are over 10,000 science and technology programs and projects underway within DoD during any recent fiscal year (DOD(R&E), 2014). The size of DoD is reflected in the scope of its procurement regulations. For instance, the Federal Acquisition Regulation (FAR) and the Defense Federal Acquisition Regulation Supplement (DFARS)—which together provide the core regulations governing DoD traditional procurement agreements—run to several thousand pages of rules and procedures covering virtually every part of the DoD procurement process.

The FAR and DFARS can pose daunting administrative barriers for small businesses and nontraditional contractors unfamiliar with DoD procurement requirements. This has reportedly contributed to the shrinking pool of defense contractors and the consolidation of the defense industry into a few large contractors such as Boeing and Lockheed Martin that have the resources to work in the complex DoD procurement regulatory ecosystem (Bloch, By, & James, 2002). Additionally, recent budget pressures on DoD such as budget sequestration have spurred congressional and DoD actions to downsize the DoD acquisition workforce. However, while DoD's procurement needs have grown in the last several decades, the number of experienced DoD procurement officials has decreased (Kelman & Schooner, 2009). A growing percentage of the DoD procurement workforce is eligible for retirement, and the outflow of talent and experience from DoD may exacerbate the ability of DoD to negotiate and administer traditional

procurement agreements for developing and delivering advanced technologies for DoD mission requirements.

These and other challenges facing the DoD procurement system have been documented over the last several decades (Dunn, 2009). But despite a series of studies and reports that have recommended that DoD should reform its procurement system to adopt commercial practices, there has been institutional resistance and lack of inertia in implementing significant changes to the DoD procurement system. Indeed, the number of procurement rules, regulations, and policies have increased rather than decreased in recent decades.

Intensifying this problem, as mentioned, DoD is no longer the primary customer of the advanced technology marketplace; for instance, for information systems, microelectronics, computer software, and other technology sectors critical to national defense. Commercial technology is the primary driver of innovation in the domestic and global markets. There has been a leveling of the technology field because other countries have access to commercial technologies on a par, or sometimes that exceed those available to the DoD. DoD must compete with the business sector and other nations for access to the latest technologies (Dunn, 2009).

These trends impact the DoD strategic goal to maintain technological superiority over potential adversaries. Technological superiority over adversaries is a linchpin of U.S. military dominance. The current DoD R&D strategy recognizes that technological superiority has been central to the DoD strategy for the past century and that the future strategy relies on several key tenants, including that the delivery of advanced technology systems remains a high priority (DOD(R&E), 2014). The strategy commits DoD to continuing to invest in advanced technology R&D, noting that “The pace of scientific and technological innovation is occurring more rapidly and in more places by more people and with increased ability to spread on a global scale like

never before . . . The DoD R&D enterprise must remain flexible, responsive, and adaptive, even as budgets decline in new threats and challenges emerge” (DOD(R&E), 2014, p. 11).

DoD’s commitment to delivering advanced technology systems has resulted in a renewed focus on investing in prototype activities for advanced technology systems to show their effectiveness early in the acquisition life cycle (DOD(R&E), 2014). By investing in prototype processes, DoD hopes to generate useful technical information that will reduce technical uncertainty and create information that will improve the quality of the later program and technical decision-making. Open approaches to innovation—for the acquisition of intellectual property and using nontraditional contracting mechanisms such as OTs, prizes, and challenges and similar novel methods—are needed to increase the speed, quality, and diversity of performers that contribute to the federal government mission (White House, 2016).

Within the DoD procurement community, a series of Better Buying Power (BBP) policy initiatives have, over the last decade, emphasized the need for DoD to focus on technology innovation and to field advanced technology products (DOD(AT&L), 2015). The BBP policies assume that the technological superiority of the United States is no longer guaranteed, and so the ability to innovate and field dominant capabilities through technical excellence is necessary to meet this challenge. Concern about maintaining technological superiority is the central theme of the BBP. “The theme that ties the content of BBP 3.0 together is an overriding concern that our technological superiority is at risk . . . Potential adversaries are challenging the U.S. lead in conventional capability in ways not seen since the Cold War. Our technological superiority is based on the effectiveness of our research and development efforts” (USD(AT&L), 2015, p. 2).

Underlying this concern is the perceived complexity of federal procurement laws and regulations and the need to remove non-productive and non-value added regulatory activities.

BBP is a policy response to the OT literature's observation that many companies hesitate to do business with DoD because of what they perceive as rigid and costly procurement laws and regulations (Cassidy, Jennifer; Barclay, Stephanie H, 2013). Thus, the intent of BBP "Is to reinvigorate the use of prototyping and experimentation for the purposes of rapid fielding of technologically advanced weapon systems, providing Warfighters with the opportunity to explore novel operational concepts, supporting key elements of the industrial base, and hedging against threat developments or surprises by advancing technology and reducing the lead time to develop and field new capabilities" (DOD(AT&L), 2015, p. 12). As discussed below, one approach that DoD has taken consistent with BBP is to use OTs develop innovative technology solutions for defense requirements.

The DoD procurement system is meant to develop and deliver DoD's advanced technology systems. Since the 1990s, DoD has had several rounds of procurement reforms meant to address the problem of leveraging the technological expertise and products of the private sector. These have included acquisition reform targeted at acquiring commercial goods and services and efforts to increase the business awareness, flexibility, and discretion of DoD contracting employees (Schooner, 1997). Congress has responded to the need for procurement to keep up with the pace of commercial technology by taking legislative action to pass laws to simplify the federal procurement system and to improve the DoD's ability to buy the innovative technology solutions from the private sector at competitive costs (Fike, 2009).

OTs are exemplary of this legislative initiative. OTs were first authorized by Congress in 1989 and are intended to address the problem of attracting innovative contractors that have otherwise been reluctant to partner with DoD because of the perceived bureaucracy associated

the federal procurement system (Stevens, 2016). As discussed in the legislative history section below, Congress has amended the OT statute several times to encourage wider DoD use of OTs.

Appendix B provides a sample OT. The sample OT was part of a DARPA program to address a critical need for measurement of blast exposure in combat troops for correlation to resulting blast traumatic brain injury (bTBI). The low cost, disposable blast gauge developed under the OT is designed to measure both pressure transients and resulting head acceleration due to explosive blast. The potential health and safety benefits of the blast gauge to combat troops are clear and illustrate how valuable OTs can be for meeting national defense requirements.

Appendix C provides the current version of the DoD OT statute, 10 U.S.C. § 2371b (2371b, 2017). This version of the statute was familiar to most of the study participants. In addition to DoD, ten other federal agencies have statutory authority to use OTs. Depending on the scope of the specific statutory authority for the related agency, OTs can be an effective method to acquire R&D services from nontraditional contractors (Hephner, 2018). Appendix C summarizes the OT statutes for the eleven federal agencies that currently have OT authority. The study, however, was purposely delimited to the DoD OT statute. This study delimitation and others are discussed in Chapter 3.

OTs are supposed to be more streamlined than traditional DoD procurement agreements. The fundamental difference between OTs and traditional DoD procurement agreements is that OTs are exempt from most of the statutory, regulatory, and policy requirements of traditional procurement agreements (GAO-16-209, 2016). Thus, using an OT enables the DoD organization and the OT contractor to start negotiations with a clean sheet of paper rather than burdened by a contract template full of scores of mandatory clauses and dense boilerplate contract language. In this manner, OTs enable DoD and contractors to negotiate an

agreement tailored to meet needs of the parties, particularly the business requirements of the contractor. This flexibility opens a range of opportunities for innovative procurement strategies and processes (Smith, Jeffrey A. Drezner, and Irving Lachow, 2002).

OTs have a solid record of being successfully used to leverage these opportunities, resulting in breakthrough defense technologies (Smith, 2002, Halchin, 2011). For instance, DoD used OTs to pioneer development of the first unmanned aerial vehicles and unmanned combat aircraft, and recently, the revolutionary naval electromagnetic rail gun (Dunn, 2009; GAO-16-209, 2016). Yet despite these and other documented technology successes, and attendant administrative cost savings, OTs have not been as widely used by DoD as envisioned by Congress and DoD policymakers. This problem persists in the face of repeated attempts by Congress to delegate broader authority to DoD to use OTs. DoD's need for innovative technologies is more pressing than ever, given new threats and competitive technology challenges posed by peer states and potential non-state adversaries. As discussed in Chapter 2, the OT literature has not identified many policy solutions for increasing DoD's use of OTs. There are few historical institutionalism studies that discuss U.S. national policy systems and none found that discuss OTs.

So, while OTs can help DoD tap into private sector advanced technologies and know-how, DoD's inability or unwillingness to more widely use OTs remains an unsolved and understudied policy problem. This puzzle was the primary motivation for the study. Therefore, the study focused on investigating why DoD does not more widely use OTs. The goal is to contribute to the OT and historical institutionalism literature and to make policy recommendations that may encourage wider DoD use of OTs. The study also tries to outline

future research of the DoD OT program that may improve understanding and resolving the longstanding policy problem of why DoD has not used OTs more widely.

Legislative History of Other Transactions Agreements (OTs)

The legislative history of the OTs reflects the procurement evolution of the U.S. defense industry. Before World War II, the defense industry was small and transitory. For instance, during World War I, the commercial sector was mobilized to support the war effort, but following the armistice the sector transitioned back to a business focus and retooled and dedicated itself to commercial customers (Dunn, 2009). Between the World Wars, the federal government relied on its own arsenals and shipyards for developing and producing weapons for its particular needs. Thus, the federal government funded, researched, developed, and fielded its own technologies for defense requirements. There was no significant need to attract contractors to work with the federal government to meet defense technology needs.

This industrial calculus changed during World War II. During the war, there was a nationwide mobilization of industry to support the war effort. Contractors made significant contributions to ramping up industry to logistically support the Allied war effort. The wartime industrial mobilization accounted for the overwhelming numbers of aircraft, ships, tanks, and other military goods and services that fueled Allied victory over the Axis forces. After World War II, the Cold War soon ensued, which changed the industrial government production paradigm that had existed (Dunn, 2009). High-tech weapons systems such as intercontinental missiles, nuclear submarines, mainframe computers, and atomic weapons became critical in the race between Russia and the United States to establish global strategic supremacy. With a

protracted strategic standoff with the Soviet bloc, however, the United States and private industry entered a period where a specialized industry—the military defense industry—emerged and coalesced.

By the end of the 1950s, major defense contractors such as Boeing made increasing investments in R&D. The federal government invested enormous resources into R&D and weapon system development to keep strategic parity with the Soviet Union. The space race with the Soviet Union also contributed to integrating federal government and military defense industry efforts on relevant advanced technologies. During the 1960s through 1980, federal government R&D spending outpaced private industry R&D spending. The space race and the Cold War resulted in massive government outlays for R&D in strategic weapon technologies and space technologies.

However, by 1980, with burgeoning information and consumer electronics industries driving industry R&D investments and profits, private industry's share of R&D reached parity with DoD R&D spending (Dix, Lavalley, & Welch, 2003). By the mid-1980s, private sector displaced the federal government as the leading source of domestic R&D funding (Sumption, 1999; Smith, 2002). DoD was no longer the primary customer for information systems and microelectronics, as it had been in the 1960s and early 1970s (Smith, 2002). This trend continued, and by 2000 three-quarters of all R&D performed in the United States was funded by the private sector (Dix et al., 2003). DoD budgets, which reached their apex in 1985, decreased throughout the latter 1980s (Sumption, 1999). By the end of the 1980s, there was increasing congressional concern that DoD would not have access to the most advanced technologies necessary to keep technology dominance against new and evolving threats (Halchin, 2011).

With this historical context in mind, the origins of DoD's OT authority can be traced to legislative developments in the late 1950s. In 1958, Congress enacted 10 U.S.C. § 2358, which for the first time authorized DoD carry out military-relevant R&D projects outside of the traditional regulatory process (10 U.S.C. 2358, 2017; Modeszto, 2005). This statute presaged OTs and has been amended several times, including in 2017 to add OTs to the types or agreements that may be carried out under the law (Pub. L. No. 115-91, 2017, Sec. 862)).

Also, in 1958, responding to the Russian Sputnik satellite launch, Congress created NASA under the Space Act (Pub. L. No. 85-658, 1958). Among its other provisions, the Space Act allowed NASA to "enter into other transactions as may be necessary" (Pub. L. No. 85-658, 1958, Sec. 203(a)(5)). In the years that followed, NASA used this new procurement authority to carry out a variety of innovative contractual arrangements with the private space industry, for instance, to build and launch the first communications satellites (Dunn, 2009). NASA referred to these new procurement arrangements as Space Act agreements. NASA continues to use Space Act agreements today (NASA, 2017).

NASA Space Act agreements were the legislative forbearers of DoD OTs. In the following years, Congress and DoD took notice of NASA's success at using Space Act agreements to collaborate with industry on advanced technology projects. Policymakers became interested in fashioning a Space Act type agreement process to meet DoD's need for access to advanced technologies. This interest increased in the late 1980s when it grew clear that DoD R&D investments were being outpaced by private R&D investment.

Procurement bureaucracy also became seen as a barrier to DoD gaining access to the latest technology. For instance, in 1986, a congressionally appointed group known as the Packard Commission claimed an increasingly bureaucratic and over-regulated DoD procurement

process as the reason that weapon systems were taking too long to develop, costing too much, and incorporating old technologies (Fike, 2009). Underscoring this claim was a general perception that the DoD procurement system was “rigged” because it operated to favor large defense contractors at the expense of nontraditional contractors (Modeszto, 2005, p. 216).

Nontraditional contractors became skeptical of the transparency and integrity of DoD procurement processes, chilling this critical segment of private industry from offering their innovative technologies to DoD. Studies by think tanks during the late 1980s and early 1990s corroborated these findings (Sumption, 1999). These studies found that DoD’s unique contracting requirements—not access to private industry technology—was the primary reason that civil-military integration efforts were unsuccessful. There were increasing calls for DoD make efforts to adopt commercial business practices, including in procurement (Sumption, 1999). As a result, Congress focused on DoD acquisition reform, with intent to make the DoD procurement process faster, cheaper, and better (Smith, 2002; Stevens, 2016). OTs were one reform considered for reducing the regulatory and bureaucratic overhead associated with traditional procurement contract methods.

Within DoD, DARPA spearheaded efforts to petition Congress for more procurement tools to help it to contract with contractors that would otherwise not do business with DoD because of the perceived complexity and rigidity of the DoD procurement system. DARPA needed more flexible procurement tools to attract innovative contractors to do R&D work on DARPA advanced technology projects (Kuyath, 1995). During the late 1980s, DARPA experienced problems getting contractors to agree to accept DoD’s intellectual property, cost accounting, and government property rules. The rules were seen as barriers to the most promising contractors agreeing to engage in R&D projects for DARPA (Fike, 2009). In response

to this problem, several special interest groups lobbied Congress for more authority for DARPA to contract with the best and brightest companies (Fike, 2009). These groups petitioned Congress to allow DARPA to use OTs, which previously had only been approved for use by NASA under the auspices of Space Act agreements. These lobbying efforts, and special reports and studies during the preceding decade, called for DoD acquisition reform influenced Congress to enact OT authority for DoD.

In 1989, preceding the passage of the original DoD OT statute, the Senate Armed Services Committee (SASC) noted that the maturation of many technologies funded by the DARPA has significant commercial application (S. Rep. No. 101-81, 1989). The SASC applauded DARPA and recommended passage of the OT statute to further such efforts. Subsequently in 1989, the original OT statute was enacted (Pub. L. No. 101-189, 1989). However, the original law limited OTs to basic research projects by DARPA. There was no authority under the new OT law for DARPA or DoD to carry out prototype projects. But since then, Congress has repeatedly expressed its preference for increased use of OTs (Vadiee & Garland, 2018, p. 6). Significant legislative amendments to the original OT statute are cited in Appendix D and are briefly summarized below.

In 1993, Congress expanded the OT statute. Under section 845 of the National Defense Authorization Act (NDAA) for fiscal year 1993, Congress authorized DARPA to use OT authority to carry out prototype projects relevant to weapons or weapon systems proposed to be acquired or developed by DoD (Pub. L. No. 103-160, 1993). Thus, for the first time, DoD, DARPA, could use OT authority to build prototypes of weapon systems.

In 1996, Congress extended OT prototype authority to the Military Departments and any other official designated by the Secretary of Defense (Pub. L. No. 104-201, 1996). The amended

statute further required that competitive procedures be used to the greatest extent practical for publicizing and awarding OTs.

In 2000, Congress again considered expanding the OT statute. Congress reflected on the usefulness of the OT authority to the civilian and military industrial bases, observing that other transactions authority is an important acquisition tool that facilitates the integration of civilian and military capabilities and that facilitates incorporation of industrial technology into military weapons systems (H. Rep. No. 106-616, 2000).

In 2003, Congress expanded the definition of a prototype project. In considering this amendment, the SASC observed that the revised statute would allow DoD to use OTs for fielded systems and weapon systems (S. Rep. No. 108-46, 2003). The definition of prototype project was broadened to give nontraditional contractors more opportunities to take part in OTs and for OTs to be used for modernizing fielded systems (Pub. L. No. 108-136, 2003).

In 2006, Congress added a crucial procedural safeguard to the OT statute. The amended law required that OTs costing between \$20-100 million may only be awarded upon a prior written determination by the Senior Procurement Executive agency for the DoD agency or Military Department involved (Pub. L. No. 109-163, 2006). OTs greater than \$100 million may only be awarded upon written prior approval from a senior official at the Pentagon and 30-days written notice to the congressional defense committees. This threshold was later raised to \$250 million and, as discussed below, is now \$500 million (DOD(AT&L), 2016).

In 2014, Congress expanded the definition of nontraditional contractor (Pub. L. No. 113-291, 2014). Congress also expanded the definition of a prototype project. The new definition of a prototype project included projects that enhance the mission effectiveness of military personnel in the supporting platform systems, components, or materials proposed to be acquired or

developed by the DoD or to the improvement of platform systems, components, or materials in use by the Armed Forces. The amended law added small businesses to the definition of nontraditional contractor. These changes broadened the scope of prototype projects, and by adding small businesses to the definition of nontraditional contractors, created new opportunities for small businesses to collaborate with DoD on OT projects.

In 2016, Congress made OT authority permanent by codifying the law at 10 U.S.C. § 2371b (Pub. L. No. 114-92, 2015). Supporting codification, the House Armed Services Committee (HASC) noted that OTs had been a useful tool for research and development contracts, for innovative organizations like DARPA (H. Rep. No. 114-102, 2015). The HASC supported DoD using flexible tools such as OTs for contracting needs and emphasized that permanent OT authority will give DoD new confidence in the experimentation and organizational learning necessary to remain competitive in the commercial marketplace. The SASC echoed this, noting that OTs continue to give DoD access to innovative, innovative technologies developed by companies that might otherwise be unwilling to do business with DoD (S. Rep. No. 114-49, 2015).

In 2017, Congress made additional significant changes to the OT statute (Pub. L. No. 115-91, 2017). Congress raised the OT project approval level for the Secretaries of the Military Departments, DARPA, and other designated DoD officials to \$500 million (Pub. L. No. 115-91, 2017, Sec. 864; 10 U.S.C. 2371b, 2017, para. (a)(2)). This means these officials now have authority to approve OT awards for their organization up to \$500 million without having to seek added approval from the Pentagon or notifying Congress.

Another significant change was that where a contractor cost-share is required, for instance, where no nontraditional contractors are taking part in the OT, non-federal sources other

than the federal government may provide the cost-share (10 U.S.C. 2371b, 2017, para. d(2)).

This change opens the door for third parties such as venture capitalists and nonprofit organizations to provide outside funding for DoD OTs.

For the first time under the OT statute, Congress allowed small business participation in the Small Business Innovation Research (SBIR) and Small Business Technology Transfer Program (STTR) programs to use OTs (10 U.S.C. 2371b, 2017, para. d(2)). This historic change means that DoD is now authorized to award OTs to small businesses taking part in the DoD SBIR/STTR programs, providing these important DoD small business programs with a new procurement tool to attract small businesses to seek SBIR/STTR funding.

The amended OT statute directed DoD to make sure that DoD personnel involved in negotiating and administering OTs are given education and training about OTs (Pub. L. No. 115-91, 2017, Sec. 863; 10 U.S.C. 2371b, 2017, para. (g)). Another historic change to OT authority was to direct DoD to establish a preference, to be applied in the circumstances determined appropriate by DoD, for using OTs (Pub. L. No. 115-91, 2017, Sec. 867). This legislative change ushers in a future where DoD policy could establish OTs as the preferred types of agreement for some or all DoD R&D work.

In making these changes, the HASC encouraged DoD to revise and reissue OT policy guidance. “Due to the changes that have been made to this authority in recent years, the committee encourages the Department to revise and reissue guidance on using OTAs” (H. Rep. No. 115-200, 2017, p. 172). The SASC also reaffirmed its support OTs and encouraged DoD to expand knowledge and awareness of OTs for DoD leadership and procurement professionals. It noted that lack of knowledge about OTs “leads to an overly narrow interpretation of when OTAs may be used, narrow delegations of authority to make use of OTAs, a belief that OTAs are

options of last resort for when FAR-based alternatives have been exhausted, and restrictive, risk-averse interpretations of how OTAs may be used . . . These behaviors force innovative projects and programs into restrictive contracting methods, adding bureaucracy, cost, and time” (S. Rep. No. 115-125, 2017, p. 189).

Congress also admonished DoD to use OTs in the most flexible ways permissible, and DoD senior leaders should tolerate the added risks that may come with permitting such flexibility: “Making use of OTAs, and their associated flexibility may require senior leaders and Congress to tolerate more risk . . . Such risks can, and should, be mitigated through various means from oversight to program design and acquisition strategies” (S. Rep. No. 115-125, 2017, p. 190).

Congress noted how using OTs in the DoD SBIR and STTR programs will both enhance the mission effectiveness of the Department and help carry out these programs. “Encouraging and supporting the Department of Defense to use proven innovative procurement processes such as OTAs for funding agreements under the small business programs will both enhance the mission effectiveness of the Department and help accomplish the mission of the programs” (S. Rep. No. 115-125, 2017, p. 190).

Congress required several DoD organizations to develop, in collaboration with the Defense Acquisition University, an OT curriculum of education, training, and experiential learning for DoD personnel (S. Rep. No. 115-125, 2017, p. 191). In directing DoD to set up a preference for using OTs, Congress reaffirmed its support for using nontraditional procurement agreements for R&D work, recommending that “The Secretary of Defense to establish a preference for using transactions other than contracts, contracts, cooperative agreements, and

grants for Science and Technology, prototyping, and experimental purposes pursuant to sections 2371, 2371b, and 2373 of title 10, United States Code” (S. Rep. No. 115-125, 2017, p. 191).

Therefore, at the time of the study, the OT statute reflects its legislative evolution over the last several decades. As codified in 10 U.S.C. § 2371b, OTs give DoD organizations a statutorily codified, non-procurement tool that has a solid track record of attracting innovative contractors to partner with DoD to develop advanced technologies for national defense.

Overview of the DoD Budget and Workforce

This section summarizes DoD budget and workforce numbers for fiscal years 2011 through 2015, the most recent five-year period for which the researcher could locate reliable data. The DoD budget is a major part of the overall federal government budget. In fiscal year 2015, the DoD budget accounted for about 21% of the overall federal government budget (Harrison, 2014). The Table below shows that federal government procurement spending was about half a trillion dollars per year between fiscal years 2011 and 2015 (NCMA, 2016).

Table 1. Federal Procurement Spending and Total Numbers of Contract Actions, Fiscal Years 2011-2015

	2011	2012	2013	2014	2015
Total Spending (Dollars in Billions)	540.2	519.4	463.6	446.0	439.7
Total Number of Contract Actions	3,395,511	3,116,799	2,505,897	2,515,525	3,856,354

Source: National Contract Management Association (2016).

The Table above shows that during fiscal years 2011-2015 the federal government spent over \$2.4 trillion on procurement. The DoD procurement budget during this period was about \$538 billion, or 22% of overall federal procurement spending during this time. The DoD R&D budget is a subset of the DoD procurement budget. DoD OT spending is a subset of the overall DoD R&D budget.

Table 2. DoD Budget Categories and OT Spending, Fiscal Years 2011-2015
(Dollars in Billions)

	2011	2012	2013	2014	2015
Total DoD Budget	691.4	655.4	585.2	586.9	581.3
DoD Procurement Budget	131.9	118.3	97.8	99.5	90.3
DoD RDT&E Budget	76.7	72.0	63.3	62.9	63.5
DoD OT Spending	0.01	0.5	0.4	0.6	0.6

Sources: National Science Foundation, National Center for Science and Engineering Statistics (June 29, 2015); Government Printing Office (2013); Federal Procurement Database System–Next Generation (2016).

As the Table above shows, DoD financial spending for OTs was small compared total DoD R&D spending during the same period. However, the Table also shows that DoD recorded OT financial expenditures of over \$2.2 billion during fiscal years 2011-2015. Data collected from the government-wide Federal Procurement Database System (FPDS) indicates that annual spending on OTs has continued to increase, providing a quantitative indicator that DoD may be using OTs more widely each fiscal year. FPDS is a publicly available federal government-wide database that federal agencies are required to use to report data on contract actions whose

estimated value is \$3,500 or more (GSA, 2016). However, the FAR and DFARS do not require OTs to be reported in FPDS.

DoD is the world's largest employer (Taylor, 2015). In fiscal year 2015, the DoD workforce comprised nearly three million military and civilian employees. The following Table provides a breakout of the DoD workforce.

Table 3. Numbers and Categories of Employees in the DoD Workforce in June 2015

Employee Workforce Category	Number of Employees
Active Duty Military	1,342,483
National Guard & Reserve Military	825,000
Civilian DoD Employees	721,005
TOTAL	2,889,443

Source: Defense Manpower Data Center (January 2017).

DoD is a global organization. In fiscal year 2015, DoD had bases, depots, and offices in over 600 locations in 73 countries (Merelli, 2015). DoD R&D organizations, however, are concentrated in the United States. In 2015, DoD had 35 R&D organizations in 22 states and employing tens of thousands of DoD employees and support contractors (DOD Innovation Marketplace, 2017). So, the DoD OT program is part of the institutional setting of the world's largest employer and that spends hundreds of billions of dollars on procurement. The DoD R&D organizations—which were the work locations for most of the study participants—span the nation and employ tens of thousands of people.

OT Numbers and Spending

There is not much published information on the numbers of OTs. The DoD OT statute originally required DoD to submit an annual report to Congress summarizing OTs awarded in the prior fiscal year. But this reporting requirement was repealed in fiscal year 2006 (Pub. L. No. 108-136, 2004). The Government Accountability Office (GAO) recently surveyed federal agencies and found OT use is limited and mostly for R&D (GAO-16-209, 2016, p. 16). The following Table summarizes the numbers of OTs at federal agencies in fiscal years 2010-2014.

Table 4. Numbers of Active OTs at Federal Agencies, Fiscal Years 2010-2014

Federal Agency	2010	2011	2012	2013	2014
Advanced Research Projects Agency-Energy (ARPA-E)	3	3	3	3	0
DoD	69	76	88	77	79
Department of Energy (DOE)	2	3	3	3	3
Department of Health and Human Services (HHS)	0	0	0	1	1
Department of Homeland Security (DHS)	19	14	8	4	3
Department of Transportation (DOT)	75	54	30	26	21
Federal Aviation Administration (FAA)	44	48	54	60	65
NASA	2,217	2,611	2,891	3,080	3,223
National Institutes of Health (NIH)	6	6	6	5	5
Transportation Security Agency (TSA)	408	435	564	579	637

Source: GAO-16-209 (2016).

As the Table above shows, the numbers of active DoD OTs remained relatively steady between fiscal years 2010 to 2014. NASA and the TSA accounted for the majority of active OTs during these fiscal years. According to the GAO, “TSA’s increased use of other transaction agreements was mostly driven by its checked baggage program, which provides funding through agreements to airports to design and construct the infrastructure needed to install equipment for screening checked baggage” (GAO-16-209, 2016, p. 28). NASA’s relatively large numbers of OTs (Space Act agreements) were attributed to retirement of the Space Shuttle which freed up resources for NASA to use for OTs with outside entities.

From the study’s perspective, the Table above reflects, and Appendix C shows that NASA and TSA have different OT statutory authorities for OTs than DoD. TSA uses OTs for its checked baggage program, and NASA has its Space Act authority. But unlike DoD, neither agency has authority to use OTs for prototype projects. So, the numbers of federal agency OTs in the Table above reflect that each agency has its own OT statute, with a specific scope and delegated authorities. Since each federal agency has its own OT statute, with differing scope of delegated authorities, the researcher determines that the numbers of OTs at other federal agencies are not relevant to answering the study's research question about why DoD has not more widely used OTs.

There is little recently published information on dollars spent on OTs, for instance, by DoD organizations. But a recent DoD OT white paper found that the biggest DoD users of OTs were the Army (Picatinny Arsenal), DARPA, and the Defense Threat Reduction Agency (DTRA) (DOD(DPAP), 2015). The following Table summarizes dollars obligated on OTs by these DoD organizations, the Air Force, and the Army, during fiscal years 2011 to 2014.

Table 5. Dollars Obligated on OTs by Selected DoD Organizations, Fiscal Years 2011-2015
(Dollars in Millions)

DoD Organization	2011	2012	2013	2014	2015
DARPA	69.1	33.1	25.2	38.3	57.8
DTRA	65.8	21.4	6.8	2.8	-
Air Force	0.3	5.1	0.7	1.6	-
Army	476.8	391.9	314	529.9	580.3
Navy	-	-	1.1	2.7	2.3

Source: DOD(DPAP) (2015).

The Army's relatively large share of DoD dollars obligated during this period likely reflects the ongoing success of the DOTC. The DOTC consists of over 650 companies (members). The DOTC operates under an OT between the Army and the ATI, the DOTC management firm (DOTC, 2018). The DOTC OT has resulted in hundreds of OTs awarded to DOTC members, totaling more than \$3 billion since 2009 (DOTC, 2018).

There are signs that federal OT activity is on the upswing. Reportedly, federal-wide spending on OTs is increasing, up from a federal-wide total of \$1 billion in fiscal year 2012 to \$2.3 billion in fiscal year 2017 (Vadiee & Garland, 2017). Within DoD, spending on OTs was \$412 million in fiscal year 2017 (Doubleday, 2018). Recent news stories report that current OT spending may be significantly higher, for instance, stating that the military services spent nearly \$21 billion through 148 OTs between 2015 and 2017 (Maucione, 2018). The researcher was unable to verify these large OT spending numbers reported by news media. But the apparent uptick in OT spending influenced the study's research hypothesis, which theorizes that the numbers and variety of OTs are increasing at some DoD organizations.

OTs Compared to Traditional Procurement Agreements

DoD generally uses two general types of purchasing agreements: traditional procurement agreements and OTs. While DoD uses OTs to buy militarily useful prototypes of new technologies, DoD uses traditional procurement agreements—typically contracts—to buy goods and services (Cibinic, Nash, C., Yukons, C., 1998). Many laws, regulations, and policies control how such goods and services are procured. These processes systematize traditional procurement agreements across DoD, helping to protect the interests of DoD while maintaining transparency, accountability, and public confidence in the DoD procurement system. The primary method of controlling how traditional procurement agreements are awarded and administered is through federal regulations. For procurement contracts, the FAR and the DFARS provide regulations that govern procurement processes across DoD (FAR, 2015; DFARS, 2015). Major DoD organizations such as the Army, Navy, and Air Force have additional organization-specific acquisition regulations that augment the FAR and DFARS.

DoD also has procurement policies. The senior acquisition official for DoD, the Undersecretary of Defense for Acquisition Technology and Logistics (USD) AT&L (recently renamed as the Undersecretary for Defense for Acquisition and Sustainment (USD) A&S, is in charge of the Defense Procurement and Policy (DPAP) office at Pentagon. DPAP publishes procurement policies applicable to all DoD organizations (DOD(DPAP), 2017). Together, the FAR, DFARS, organization-specific acquisition regulations, and DPAP policies establish uniform procurement processes that govern virtually every aspect of procurement contracts. The study reviewed the FAR, DFARS, organization-specific acquisition regulations, and DoD procurement policies as part of conducting the participant interviews and case studies.

DoD's implementation of its procurement regulations and policies is subject to oversight by the GAO via the bid protest process. Under the GAO's bid protest regulations, contractors that take part in DoD source selections for contract awards can protest to the GAO if they believe DoD violated a procurement law, regulation, or policy in awarding a contract. If GAO agrees with the contractor, it can sustain the protest and recommend that DoD take corrective action. The DoD Inspector General also carries out oversight of the DoD procurement system (DOD(IG), 2017). The DoD Inspector General investigates allegations of criminal misconduct and violations of procurement integrity and ethics regulations.

DoD is also subject to oversight by eight congressional committees (DOD(Health), 2017). The two most relevant to the study are the HASC and the SASC. The study reviewed HASC and SASC reports, GAO protest decisions and DoD IG audit reports as part of the literature review summarized in Chapter 2.

As discussed below, grants and cooperative agreements are additional types of traditional procurement agreements (FAR, 2015, § 2.101). Grants and cooperative agreements are used to assist private organizations, or sometimes to state and local governments (Cibinic, Nash, C., Yukons, C., 1998). The study considered grants and cooperative agreements to be traditional procurement agreements to help distinguish them from OTs. Like procurement contracts, specific laws, regulations, and policies regulate the processes governing grants and cooperative agreements. Within DoD, the Defense Grants and Agreement Regulatory System (DGAR) provides uniform regulations for DoD organizations to award and administer grants and cooperative agreements (DGAR, 2011). Much as the FAR and DFARS do for procurement contracts, the DGAR provides processes for ensuring that grants and cooperative agreements are awarded in a manner that reflects the fundamental principles applicable to procurement

agreements, competition, fairness, accountability and preserving public trust. Thus, for the study, contracts, procurement contracts, grants, and cooperative agreements were considered being traditional procurement agreements and distinguished from OTs by the detailed scheme of regulations—largely, the FAR, DFARS, and DGAR—that systematize DoD’s use of traditional procurement agreements.

Traditional procurement agreements

As discussed above, traditional procurement agreements include procurement contracts, cooperative agreements, and grants. A procurement contract means acquisition using competitive procedures to award a contract for goods or services to non-federal sources by a federal agency using appropriated funds (DOD(AT&L), 2017a; 41 U.S.C. 2101, 2016, p. 4 (Definitions)). Procurement contracts are advertised, negotiated, awarded, and administered under the regulations in the FAR, and in DoD, additionally under regulations in the DFARS (DOD(AT&L), 2017a).

A grant is a legal instrument used to enter a relationship, the principal purpose of which is to transfer a thing of value to the recipient to carry out a public purpose of support or stimulation allowed by a law of the United States, rather than to acquire property or services for the DoD’s direct benefit or use (DODD 3210.06, 2014, Glossary). Under a grant, the relationship between DoD and the grant recipient assumes that DoD does not expect its substantial involvement in the grant activities (DODD 3210.06, 2014, Glossary). Thus, a grant is different from an OT, where DoD is substantially involved in the OT activities, and moreover, where these activities are to develop a militarily useful prototype. Grants further the public

interest whereas OTs are specifically meant to develop advanced technologies for DoD interests. Grants are advertised, negotiated, awarded, and administered under the regulatory scheme of the DGAR.

A cooperative agreement is used to enter the same relationship as a grant except that substantial involvement is expected between the DoD and the recipient when carrying out the activity contemplated by the cooperative agreement (DODD 3210.06, 2014, Glossary). Cooperative agreements are also advertised, negotiated, awarded, and administered under the regulations in the DGAR.

The DoD policy framework

In contrast to the formalized rules for acquiring supplies and services using traditional procurement agreements, the FAR provides a relatively more flexible approach to R&D contracting. FAR 35.002 states that unlike contracts for supplies and services, R&D contracts are directed at work or methods that cannot be described in advance. The regulation requires that the contracting process should encourage the best sources from the scientific and industrial communities to become involved in the program and must offer an environment in which the work can be pursued with reasonable flexibility and minimum administrative burden.

Going even further than the flexibility that FAR affords traditional R&D contracting, Mentioned earlier, OTs are a relatively new type of non-procurement agreement not subject to most of the laws and federal regulations that govern traditional procurement agreements. Also mentioned earlier, OTs are not required to follow many provisions of the FAR and the DFARS (DOD(AT&L), 2017a). To put this distinction in perspective, the FAR and DFARS provide

thousands of pages of regulations governing just about every aspect of the formation and administration of traditional procurement agreements in DoD. Almost none of these regulations apply to OTs.

A primary goal of OTs is to encourage nontraditional contractors to do business with the DoD (DOD(AT&L), 2017a). OTs attract nontraditional contractors to significantly participate in the OT project. Significant means that the nontraditional contractor is a key participant in the project—meaning it contributes significantly such as providing new products technology or accomplishing a significant amount of the project work (DOD(AT&L), 2017a). Nontraditional contractors can take part in the OT project at the prime contractor, subcontractor, or team levels. Nontraditional contractor participation is the only metric that DoD has identified for measuring the success of its OT program (Halchin, 2011). However, DoD does not publicize this metric or report it to Congress, nor does it appear to be a reliable measure of program success (Hanson, 2005). But DoD agreements officers or program managers may establish OT metrics that measure the expected benefits of the OT from a cost, schedule, performance, and supportability perspective (DOD(AT&L), 2017a).

Although OTs are not subject to most of the laws and regulations that govern traditional procurement agreements, DoD requires the agreements officer to ensure that appropriate safeguards are included in the OT to protect the government's interests (DOD(AT&L), 2017a). Thus, the agreements officer must be experienced and exercise sound business judgment on behalf of the government. For instance, the agreements officer should make sure that cost to the government is reasonable and that the schedule and other requirements of the project can be met. Experienced agreements officers are critical to the success of OT negotiations.

There is no standard DoD OT template, and this absence reflects a purposeful policy choice by DoD to encourage flexibility and innovation by agreements officers during OT negotiations (DOD(AT&L), 2017a). Thus, rather than rely on templates or prior OTs, the agreements officer is supposed to rely on his or her skill and judgment in negotiating terms of the OT. Nevertheless, it is prudent for the agreements officer to consider using typical FAR and DFARS clauses as a starting point for OT negotiations since these processes were developed over many decades to protect the government's interest (Stevens, 2016; DOD(AT&L), 2017a).

But agreements officers have the discretion to negotiate terms they believe meet the needs of the OT, and that protect the government (DOD(AT&L), 2017a). The agreements officer should encourage innovation and flexibility in negotiating the OT. If particular terms are not addressed in applicable DoD policy, and law or policy does not otherwise prohibit, the agreements officer should consider that these terms could be used if they are beneficial to the project (DOD(AT&L), 2017a). Agreements officers are also supposed to structure the acquisition strategy and advertise funding opportunities for the OT so that a traditional procurement agreement can be used if an OT is found not to be appropriate for the project (DOD(AT&L), 2017a).

Advantages of OTs compared to traditional procurement agreements

By design, OTs have fewer administrative requirements than traditional procurement agreements. As one commentator noted, there is less regulatory bureaucracy associated with negotiating and administering an OT than an analogous traditional procurement agreement (Stevens, 2016). Depending on factors such as the contract type and dollar value, a typical DoD

procurement contract can incorporate over 100 standard contract clauses. The clauses are necessary to carry out the many statutory and regulatory requirements for issues such as financial management, intellectual property, government property, and social, economic programs (Halchin, 2011). While these administrative safeguards protect the government and public interest, there have been concerns about compliance costs this imposes on the government and on contractors (Halchin, 2011).

In contrast to the plethora of standard clauses found in traditional procurement agreements, OTs start with a clean sheet of paper. This enables the parties to craft terms and conditions that meets their needs (Dix et al., 2003; DOD(AT&L), 2017a). Early on, DoD publicized a list of procurement statutes inapplicable to OTs, and the list was incorporated into the original DoD OT policy guidance (Dix et al., 2003; DOD(AT&L), 2017a). But the list, while extensive, was not exhaustive and determining whether a statute applies to OTs is fact-specific. As mentioned, few procurement statutes and regulations apply to OTs. The purposeful exclusion of OTs from coverage by procurement laws and regulations allows DoD and contractors to define the relationship for the OT project through negotiation, without the normal constraints associated with traditional procurement agreements (Smith, 2002).

Thus, under OTs, the DoD program manager can fashion program objectives and criteria for measuring progress, oversight and reporting, and the agreements officer can make sure these aims and criteria are included in the OT statement of work. In this sense, OTs provide flexibility by allowing for a procurement that more closely resembles commercial contracts (Vadiee & Garland, 2018). The quality of the OT agreement is closely associated with the skills and ability of the negotiation team (Smith, 2002).

Federal agencies have cited the administrative flexibility of OTs as one of the main reasons they will use an OT instead of a traditional procurement agreement (GAO-16-209, 2016). The freedom to draft an agreement that is customized to the needs of the technical project enables DoD to attract and work with specific types of entities such as nontraditional contractors (GAO-16-209, 2016). For DoD, it also facilitates innovative business relationships with private industry. For example, OTs enable DoD to enter a binding legal agreement with a consortium of contractors (Sumption, 1999; ONR, 2017). Although prime contractors often use subcontractors to help them do the contract work, the contractual relationship in a procurement contract is between DoD and the prime contractor. DoD has no formal relationship with subcontractors and consultants under the prime contract. However, OTs enable DoD to enter binding agreements with teams of contractors, or as more often termed, a consortium (ONR, 2017). This innovative business relationship mirrors how commercial industry conducts business (Stevens, 2016). Consortium agreements reportedly promote a higher level of trust between DoD and the consortia and team members, and among the team members themselves, because the risk of performance is shared amongst all parties, not just by the prime contractor or by DoD (Sumption, 1999).

Disadvantages of OTs compared to traditional procurement agreements

Despite their reported administrative advantages, OTs have been criticized as being improper for federal procurement needs. Questions about the propriety of OTs date back the original OT legislation in the early 1990s (Kuyath, 1995, p. 571). The OT literature identifies several potential administrative weaknesses of OTs, including lack of training for employees

involved in negotiating and administering OTs, cultural resistance, poor knowledge management, lack of oversight, and inadequate publicizing OT opportunities (Stevens, 2016). Some commentators conclude that these shortcomings have resulted in OTs being confined to use in specialized R&D contracting situations and by only a handful of DoD organizations (Dunn, 2009). Supporting this conclusion, the GAO found that most agencies use OT sparingly compared to traditional procurement mechanisms (GAO-16-209, 2016). The GAO also found that federal agency officials reported that the dollars they spent on OTs accounted for 5% or less of their total procurement expenditures in fiscal years 2010-2014.

Other OT commentators have cast DoD culture as the barrier to broader use of OTs (Sumption, 1999; Stevens, 2016). Stevens (2016), for example, finds that although DoD organizations have been using OT authority, OTs represent a significant change in culture from traditional procurement agreements. Thus, it has proven difficult for agreements officers to make such a culture change when there are familiar and proven traditional procurement processes available for them to use instead of OTs. Similarly, Sumption (1999) cites an early industry study that found that cultural resistance is the most significant barrier to implementation of procurement reform initiatives over the last several decades (Sumption, 1999, p. 409). Sumption concludes that because of the lack of knowledge or understanding about the benefits of OTs, changing from using traditional procurement agreements to OTs causes resistance and thwarts the trust necessary for successful relationships between the federal government and contractors.

Commentators have identified other administrative barriers to using OTs within DoD. Although these barriers may seem straightforward to overcome, DoD policymakers have not addressed them. For example, there is no dedicated DoD-wide website for publicizing OT

funding opportunities (Stevens, 2016). Unlike traditional procurements agreement funding opportunities advertised on a government-wide public webpage known as FedBizOpps, OTs funding opportunities which are publicized according to the local acquisition practice of each DoD organization. Thus, contractors that might be interested in OT opportunities, especially nontraditional contractors, and small businesses, sometimes do not learn about OTs because they are unaware or unable to locate where funding opportunities are advertised. This seems relatively simple to remedy, but the problem has persisted, unresolved, for decades.

Another cited administrative barrier to the wider use of OTs is a lack of training for DoD employees. There are few subject matter experts on OTs in DoD (Stevens, 2016). Thus, even though several DoD organizations have delegated authority to award OTs, there are insufficient local experts available to train procurement and program management employees on how to negotiate and administer OTs. Moreover, there is no formal OT training curriculum available for DoD agreements officers, program management employees, and attorneys. For instance, there are few OT training courses offered by the Defense Acquisition University (DAU).

There is little DoD policy on OTs (DOD(AT&L), 2002, 2017a). The DoD Guide was published in 2002 and was updated in January 2017. However, even as updated, the 2017 edition of the OT Guide only provides OT guidance, not binding policy. There are DoD OT regulations for OTs, but these regulations duplicate the wording of older versions of the OT statute and thus are outdated (32 C.F.R. Part 3, 2004).

Since the early days of OTs, critics have focused on the lack of accountability and oversight in OTs compared to traditional procurement agreements. Traditional procurement agreements are grounded on laws and regulations that have developed over decades of experience and that are meant to ensure that the taxpayers' funds are properly spent and that the

government receives good value for the dollar. By not having to follow these laws and regulations, a persistent criticism of OTs has been that there is insufficient oversight and accountability to ensure that public funds are being appropriately spent and monitored (Smith, 2002). For example, the Project on Government Oversight (POGO), a respected federal government oversight organization, has criticized the government's use of OTs for major defense programs because of the lack of oversight and public accountability (Fike, 2009).

Critics of OTs have also testified to Congress about the lack of administrative safeguards as a major shortcoming of OTs. For example, Kenneth Boehm, the chairperson of the National Legal and Policy Center, testified before the SASC about an OT agreement between the Army and Boeing for the Army's Future Combat Systems (FCS) program (Dunn, 2009). Mr. Boehm stated that the FCS program exemplified many types of abuse, including the lack of accountability and oversight found in traditional procurement mechanisms. Echoing these remarks, a recent news story discussed that the lack of administrative safeguards in OTs makes them akin to "corporate welfare" because OT contractors "just get the money, and they don't have to track how they're spending it, and they don't have to do anything" (Maucione, 2018, p. 2). But other commentators have struck a more balanced view of OTs, finding that their benefits outweigh such administrative risks. For instance, a recent GAO survey of DoD procurement officials concluded that while these officials had concerns about the oversight and management of OTs compared traditional procurement contracts, they believed the risks associated with these potential problems were outweighed by the benefits that OTs offered in terms of flexibility and ability to do business with nontraditional contractors (GAO-96-11, 1996).

OT metrics

DoD policymakers and commentators have been unsuccessful in identifying reliable quantitative metrics to measure the success of the DoD OT program. A congressional study conducted in 2011 found that despite the apparent benefits of OTs, no one has yet devised a reliable method for evaluating them that would yield quantifiable objective data supporting their validity (Halchin, 2011). The study found that the reason is that OTs are not subject to established procurement laws and regulations. Thus, the usual regulatory methods for measuring contract performance such as cost auditing or performance award fees are not available to measure OTs. Indeed, before fiscal year 2010, OTs were not even recorded and tracked by DoD. To date, the only metric that DoD has identified for measuring the success of OTs is the extent to which nontraditional contractors are taking part in the DoD OT program (DOD(DPAP), 2017). But even this metric is questionable, since studies have shown that many more traditional contractors—for instance, traditional contractors such as Lockheed Martin and Boeing—are taking part in the DoD OT program than nontraditional contractors (Fike, 2009; Halchin, 2011). Compounding this problem, DoD does not publicize nontraditional contractor participation metrics for OTs, nor does it report these metrics to Congress.

Despite these challenges, there have been several attempts to define quantitative metrics for measuring the success of the DoD OT program (Fike, 2009). Commentators, for example, have proposed that the time a DoD program office saves on contracting compliance activities could be a useful metric for measuring the success of an OT (Fike, 2009). Another potential OT metric is measuring the time saved in the negotiation phase of an OT, under the assumption that OTs take less time and resources to negotiate than a corresponding traditional procurement

agreement. But a RAND report found these types of metrics are not helpful because it is hard to assess “the path not taken” when attempting to compare and quantify the time and cost savings of OTs compared to traditional procurement agreements (Smith, 2002). Thus, the lack reliable metrics for evaluating the DoD OT program makes it difficult to determine whether OTs are more useful to DoD than traditional procurement agreements (Halchin, 2011).

A 2011 congressional study identified potential policy options for evaluating OTs (Halchin, 2011). For instance, one policy option was that OT law and policies should be changed to mandate that at least one nontraditional contractor be involved in all OTs. Another policy option is that a dedicated government website should be established for publicizing OT funding opportunities to all interested parties. To increase agency internal accountability, the level of agency approval required to award an OT should be linked to the dollar value of the OT. To improve cost and performance accountability, the congressional study recommends that OTs should have to incorporate cost and oversight mechanisms of traditional procurement agreements, creating a hybrid form of agreement that shares the characteristics of an OT and a traditional procurement agreement (Halchin, 2011). The congressional study concludes that while OTs are useful to the government, a challenge that remains is identifying a reliable evaluation method that would yield quantifiable objective data about their relative benefits of OTs to the government. But this challenge has not been met, and the lack of reliable OT metrics is another long unsolved policy issue in the DoD OT program that persists to the present.

Terms and conditions of traditional procurement agreements compared to OTs

The discussion below compare OTs to traditional procurement agreements, contrasting how they treat important agreement terms and conditions such as intellectual property, disputes, and government property. The FAR, DFARS, and DGAR regulate traditional procurement agreements. The DFARS and DGAR can be considered the same as the FAR for the comparative discussion that follows. To help frame this comparative discussion, the FAR regulations govern most aspects of the negotiation and administration of DoD contracts. The FAR codifies and publishes uniform policies and procedures for acquisition by federal agencies (FAR, 2015, § 1.101). Its regulations implement the many federal civil and criminal laws and federal policies that pertain to federal government contracting. The FAR also establishes guiding principles for government contracting, including to promote competition; minimize administrative operating costs; conduct business with integrity, fairness, and openness; and to fulfill policy objectives (FAR, 2015, § 1.102). Thus, the FAR, supplemented by the DFARS, prescribe most terms and conditions and the guiding principles for DoD contracts.

Within DoD, compliance with the FAR, including achieving its guiding principles, is the responsibility of the Secretary of Defense (FAR, 2015, § 1.202). The Secretary of Defense, acting through the USD(A&S), delegates contracting authority to the heads of DoD organization, and the organization heads further delegate this authority to contracting officers within their DoD organizations (FAR, 2015, § 1.602-1). Contracting officers may only bind the federal government up to the level of contracting authority delegated to them. The dollar level of such delegated authority is known as the contracting officer's warrant (FAR, 2015, § 1.602-1, 1.603; DFARS, 2015, § 201.602). Warranted contracting officer are the only employees that have

authority to award, modify, and terminate contracts. Although other employees such as program managers, attorneys, funds control officers, and DoD organization leadership have important roles in carrying out the FAR and its guiding principles, warranted contracting officers have sole authority to negotiate, modify, and terminate contracts for their DoD organizations. Thus, the FAR and DFARS regulations are grounded on the authority and accountability of contracting officers. Agreements officers must also be warranted contracting officers. So, a similar authority delegation process applies to agreements officers for cooperative agreements and grants (DGAR, 2011).

From a negotiation and administration perspective, OTs differ from traditional DoD procurement mechanisms in several important ways. First, because OTs are often shorter and more plainly written than traditional procurement agreements, they avoid the specialized contracting and legal terminology that typifies traditional procurement agreements (Smith, 2002). Second, every part of an OT can be tailored to meet the needs of the parties. There are no boilerplate clauses or mandatory rules that apply to OTs. This opens up a range of possibilities to make the agreement reflect the actual intent of the parties. OTs are well suited for crafting terms and conditions that distribute risk between the parties, including nonperformance and litigation risk.

The OT cost-share requirements for traditional contractors enable the government to pay less for the work than it would for the same project under a traditional procurement contract. In addition, as discussed above, OTs also allow DoD to enter innovative agreements with a consortium of contractors. In contrast, in a traditional procurement agreement, DoD is limited to doing business with a single (prime) contractor. Agreements with consortium are not possible under procurement contracts.

With these advantages in mind, a recent study found that OTs appear to give DoD more value per dollar and reduce transaction costs, overhead costs and increase administrative flexibility compared to procurement contracts (Smith, 2002). DoD policy documents reviewed during the study highlighted other significant differences between how OT and traditional procurement agreements are awarded and administered. One difference is the standard of competition that must be used to award the agreement. To the maximum extent practicable, OTs shall be competitively awarded (DOD(AT&L), 2017a). But this standard is not defined and therefore is determined by the agreements officer. Moreover, as discussed below, the determination is normally not subject to legal challenge—a bid protest—at the GAO or the U.S. Court of Federal Claims (COFC). DoD decisions to award traditional procurement agreements to contractors are often disputed by bid protests at the GAO or the COFC (COFC, 2015; GAO-B-158766, 2015).

In contrast, traditional procurement agreements have detailed regulatory requirements for competition, and there is a strong presumption that competition should be used in deciding whether a contractor is awarded a traditional procurement agreement (FAR, 2015, Part 6). There are exceptions to the presumption for competition for awarding a traditional procurement agreement, but these exceptions are narrowly defined and require formal documentation and publication. The decision to award a traditional procurement agreement noncompetitively must be publicized and is subject to GAO or COFC bid protest review if a contractor disputes the basis of the noncompetitive contract award decision.

On the other hand, as mentioned, OTs can be awarded based on the level of competition that the agreements officer determines meets the maximum practicable extent standard, and there are no GAO protest and the few judicial review processes available to contractors to challenge

the agreements officer's determination about competition. Thus, the standard of competition for an OT is lower than a traditional procurement agreement, and the agreements officer's determination on the level of competition for an OT is normally not subject to protest at the GAO or the COFC.

There are significant differences between the terms and conditions included in OTs and traditional procurement agreements. These differences impact how OTs and traditional procurement agreements are administered. One difference is the flexibility of terms and conditions. OTs provide the parties with the ability to craft terms and conditions in specific areas that are believed to be important to nontraditional contractors, including intellectual property rights, audits and cost accounting systems, disputes processes and ownership of property acquired or developed under the agreement. Traditional procurement agreements address these critical terms using standard contract clauses and boilerplate contract language that is non-negotiable by the parties. In contrast, a traditional procurement agreement is administered with the standard clauses mandated by the FAR and DFARS. Thus, an OT is administered using terms and conditions that were negotiated and tailored to achieve the goal of a specific prototype project, whereas a traditional procurement agreement generally uses standardized clauses.

Cost or pricing data

A major difference between OTs and traditional procurement agreements is that the latter requires the contractor to provide cost or pricing data to DoD. Cost or pricing data is data that the government requires the contractor to disclose to help DoD decide whether the cost of the contract is fair and reasonable (FAR, 2015, § 15.403). The threshold for reporting cost for

pricing data is any contract of \$750,000 or more. The contractor must certify cost or pricing data, certifying the data is accurate and complete. This certification can be the basis for legal action against the contractor if certification is inaccurate or incomplete. Although there are exceptions to these requirements, cost or pricing data imposes an administrative burden, and a source of risk, on contractors, small businesses, and nontraditional contractors (DOD(DCAA), 2012). In contrast, OTs do not require cost or pricing data. Instead, the contractor can provide whatever data the agreements officer determines reasonable and necessary to decide if the contractor's proposed price is fair and reasonable.

Contractor accounting system

Unlike traditional procurement agreements, OTs are not subject to the FAR Cost Accounting Standards (CAS). This means that an OT contractor's accounting system does not have to follow complex and time-consuming CAS requirements, for instance, by undergoing pre-award contract reviews by DoD auditors (discussed below). Thus, a major advantage that OTs have over traditional procurement contracts is that they enable the agreements officer to be flexible on accepting the contractor's accounting system. Where the OT is based on a traditional contractor providing a cost share, or where nontraditional contractors are not involved, the agreements officer must merely make sure that the contractor's accounting system is adequate to enable tracking of costs incurred (DOD(AT&L), 2017a). This means that in most instances any commercially acceptable accounting system can be used for tracking costs in an OT. In fact, the DoD OT Guide restricts agreements officers from requiring contractors to meet CAS accounting system requirements (DOD(AT&L), 2017a).

In contrast, in a traditional procurement agreement the contractor's accounting system is required to meet stringent CAS standards. Contractors are required to provide DoD with detailed information about their accounting systems and practices as a prerequisite to being awarded the contract (DOD(DCAA), 2012). Moreover, during contract performance, contractors must follow additional CAS requirements to make sure that contract costs are tracked and reported to DoD. These requirements are often time-consuming and expensive for the contractor to carry out.

DoD pre-award and post-award audits

Traditional procurement agreements are also subject to a variety of DoD audits, including pre-award contract audits by the Defense Contract Audit Agency (DCAA). DCAA audits the financial condition and assesses the risk of awarding a traditional procurement agreement to a contractor. DCAA also conducts pre-award audits of the prospective contractors accounting systems to decide if it meets the CAS requirements. Without pre-award DCAA audit approval, a traditional procurement agreement cannot be awarded to a contractor. These surveys and audits are time-consuming and can be expensive for contractors. In contrast, there are no pre-award audit requirements for OTs. Traditional procurement agreements are also subject to a variety of DCAA post-award audits during performance of the agreement to make sure that the contractor is tracking and billing costs incurred under the contract. Again, these can impose costs on contractors for traditional procurement agreements. There are no mandatory DCAA post-award audit requirements for OTs.

Cost sharing

Under a traditional procurement agreement, DoD may not recover costs from the contractor. DoD cannot require the contractor to pay part of the costs to do the contract work. Thus, there is generally no cost sharing between DoD and the contractor in a traditional procurement agreement. In contrast, OTs authorize cost-sharing (DOD(AT&L), 2017a). The OT statute requires that where nontraditional contractors are not involved in the project, the (traditional) contractor be required to pay at least one-third of the overall cost of the OT (10 U.S.C. 2371b, 2017). DoD can accept these funds and use the funds to offset its costs for the OT. It can also apply the recouped costs to other OT projects. Thus, OTs enable DoD to accept funds, a cost share, from traditional contractors to help pay for the costs of the prototype project. Cost-sharing OTs rarely require DoD to pay profit or a fee to the contractor (DOD(AT&L), 2017a).

Cost-sharing helps DoD offset the cost of the OT project. The potential cost savings to DoD can be significant. For instance, a GAO study of cost share contributions in OT projects found that over four fiscal years, the private sector contributed about \$1.7 billion to 72 OT agreements, totaling over 50% of the total funding for the OT projects (GAO-96-11, 1996). This equated to the non-DoD OT partners contributing about \$1.39 for every \$1.00 contributed to the OT projects by DoD. Consequently, commentators have also concluded that OT cost sharing provides a significant financial benefit to DoD by increasing affordability of OT projects (Sumption, 1999).

But at least one DoD organization has observed that the cost share requirement can be disadvantageous because it requires contractors to make a significant up-front financial

investment in the project (ONR, 2017). Under the terms of the OT, the government may have to make more milestone payments to the contractor earlier in the OT than under a comparable traditional procurement agreement. Thus, the up-front financial costs of an OT can be higher for the parties than in a traditional procurement agreement. The contractor may not recover its investments in the prototype technology if the OT fails to deliver the prototype.

Intellectual property

Intellectual property rights are essential to contractors because they give legal protection against unauthorized use of the contractor's technology when the contractor commercializes it after the agreement is completed. Many companies view intellectual property as their most valuable asset. Indeed, the OT literature sometimes refers to intellectual property as the “crown jewels” of a business (Dix et al., 2003, p. 4). Intellectual property rights are also crucial to DoD because insufficient rights can hinder DoD’s ability to competitively procure the technology from other contractors after the agreement is completed. Intellectual property refers to rights governed by an array of federal laws, including patent, copyright, trademark, and trade secret statutes (DOD(AT&L), 2017a). These laws are implemented in DoD by the FAR and DFARS. With some exceptions, these intellectual property laws generally apply to traditional procurement agreements.

The intellectual property requirements of the FAR and DFARS, however, generally do not apply to OTs. This means that agreements officers are free to negotiate intellectual property rights terms and conditions that meet the needs of the parties to the OT. But agreements officers typically start OT negotiations using the framework of the FAR regulations to draft intellectual

property terms and conditions to meet the needs of the parties. For instance, consistent with the FAR, OTs often include provisions allowing the contractor to choose to keep title to inventions discovered or first reduced to practice under the OT. OTs often include terms that define what is an invention and requirements for the contractor to report these inventions to DoD. OTs typically also include provisions that divide patent rights between DoD and the contractor. For example, DoD may be granted rights to practice the invention within the government, while the contractor keeps title to the invention. OTs sometimes also include provisions addressing trademark and trade secrets rights. This flexible approach to intellectual property is meant to attract nontraditional contractors that might otherwise be unwilling to do business with DoD for fear of losing intellectual property rights to commercially valuable technologies developed under the OT.

Government property

The FAR has detailed rules governing the acquisition, care, and disposal of government property in procurement contracts (FAR, 2015, Part 45). Government property includes contractor-acquired property purchased for performing the work under the agreement. Government property must be returned to the DoD at the end of a traditional procurement agreement unless the contracting officer arranges for sale or disposition of the property—for example, sale to the contractor at a fair market price. Sometimes DoD can abandon the property where it has minimal remaining value.

In contrast, for OTs, DoD is not required to take title to property acquired or produced under the OT (DOD(DPAP), 2017). Instead, the parties can negotiate who will take title to the

property. This approach provides flexibility for the parties to negotiate the disposition of property after the OT is over. For instance, the agreements officer can allow the contractor to take title to the property in exchange for valuable consideration. This enables the contractor to keep useful OT prototypes, which it can use to help commercialize the technology.

Disputes

Traditional procurement agreements are subject to contract award disputes known as bid protests. In a bid protest, an unsuccessful offeror for a traditional procurement agreement can file a protest at the GAO or the COFC (FAR, 2015, Part 33). In its protest, the unsuccessful bidder can allege that DoD did not follow procurement law, regulations, or policies in deciding what contractor was awarded the contract. A protest can go on for several months, and during the term of the protest, the agreement is “stayed” (stopped) from performance. Protests are time-consuming and costly and can impede DoD from cost-effectively performing awarded contracts. Protests also impose costs on the protestor and the agreement awardee. Protests are frequent. For instance, in 2015, unsuccessful offerors filed 2,639 bid protests against federal agencies at the GAO (GAO-B-158766, 2015). About 22% (587) of these GAO protests were sustained, meaning that the federal agency contract could not be awarded until the agency completed time-consuming corrective action and, in many protests, the federal agency paid the protester’s attorney fees and protest filing costs (GAO, 2017). Unsuccessful offerors also filed 119 protests at the COFC against federal agencies (COFC, 2015).

There are also contract administration dispute processes. After a contract is awarded, the contractor can submit claims for extra costs that the contractor incurred in performing the

contract work (FAR, 2015, Part 33). If DoD denies the claim, the contractor can appeal the denial to the Armed Services Board of Contract Appeals (ASBCA) or at the COFC. Again, the claims process is time-consuming and costly for all parties involved. For example, contractors must certify claims greater than \$100,000 that are submitted to the federal agency. The contracting officer must meet strict time deadlines to give a formal written response to the contractor's claim. Appeals of claim denials to the ASBCA or COFC are common. For instance, in fiscal year 2015, contractors appealed 668 claim denials to the ASBCA and filed 119 civil lawsuits at the COFC against federal agencies (ASBCA, 2015; COFC, 2015).

Bid protests and claim appeals do not apply to OTs. The GAO generally has refused to exercise jurisdiction over protests against the award of OTs because they are non-procurement agreements, thus not subject to the GAO's jurisdictional authority over procurement agreements (Kuyath, 1995; Sumption, 1999; GAO B-412711, 2016, p. 7). However, the GAO will review a bid protest in limited circumstances, for instance, protests alleging that an agency is improperly using an OT to procure goods and services (GAO B-416061, 2018, p. 11). It is undecided whether the COFC would exercise jurisdiction over a protest against the award of an OT.

In contrast, under an OT, the parties fashion the disputes resolution process, and there is no administrative or judicial avenues of redress at the GAO or the COFC. The parties can negotiate dispute resolution mechanisms that suit their needs. This can include alternative dispute resolution processes and other mechanisms for resolving disputes during performing the OT (DOD(AT&L), 2017a). Customized dispute resolution processes remove a significant source of delay, outside administrative or judicial tribunals resolving the parties, disputes, rather than the parties themselves (Cassidy, 2013).

Termination

There are detailed FAR procedures governing the termination of traditional procurement contracts (FAR, 2015, Part 49). DoD can unilaterally terminate a contract for its convenience or if the contractor fails to perform, by default. Much like for bid protests and post-award claims, there are detailed and time-consuming processes for the contractor to dispute terminations, and settlement of terminations can cost both parties considerable time and money.

The FAR contract termination procedures do not apply to OTs. Instead, the parties negotiate terms under which DoD may terminate the OT for convenience (DOD(AT&L), 2017a). But the termination provisions often allow the contractor to recover costs for work incurred up to the termination date. Sometimes OTs also include the right of the contractor to terminate the OT for its convenience. If so, DoD can recover costs incurred and property generated before the termination date. OTs often also provide provisions for negotiating settlement costs if either party terminates the OT. In this manner, OTs offer the parties enhanced flexibility in termination processes compared to traditional procurement agreements.

Rationale and Significance of the Study

The study is motivated by the researcher's professional interest in public procurement. The researcher has experience in negotiating OTs and in advising DoD clients about OTs. The researcher believes that OTs are a useful procurement-like tool for working with the private sector to develop advanced technologies for defense requirements. However, the researcher also believes that there are institutional barriers that have prevented the more widespread use of OTs.

For example, some DoD contracting and program management employees think OTs are too complicated to negotiate, suggesting that there is a lack of OT training. Others question whether DoD is getting a good return on its investment in OTs, suggesting that OT successes are not widely known. These perceived barriers have persisted for decades. The lack of reliable metrics to gauge the success of the DoD OT program makes it difficult for DoD policymakers to decide how or whether to change the program.

From a DoD policy perspective, a study of the factors affecting the use of OTs by DoD organizations is vital for several reasons. First, a better understanding of how DoD organizations use OTs may contribute to the wider use of OTs by DoD organizations.

Second, a better understanding of the institutional factors that potentially impact the scope of use of OTs from one DoD organization to another, or within a DoD organization, may also contribute to the wider use of OTs by DoD.

Third, DoD policymakers and Congress remain interested in attracting nontraditional contractors to do business with DoD, both to meet the OT statutory goals and for defense needs. OTs are believed to help DoD tap into a repository of private sector innovation and technologies that continue to elude DoD access. OTs are believed to be a tool for procuring innovative technologies from these untapped private sources.

A better understanding of what factors influence the use of OTs across DoD organizations may help DoD gain access to more innovative technologies. This could lead to improved technology outcomes for national defense. Thus, the significance of the study is that it might offer fresh insights on an enduring DoD policy problem, what factors have prevented the wider use of OTs by DoD? The study investigates this policy problem from the perspective of

interviewing participants at various DoD organizations and by using two OT case studies selected with the help of participants.

The OT case studies are used to corroborate data collected in the organization participant interview. Using a pragmatic, epistemological approach to institutional analysis, the study hopes to gain useful insights into resolving this issue and that might help policymakers to design policy solutions to encourage wider use of OTs, which may cause improved technology outcomes for national defense.

Research Hypothesis

The study's research hypothesis is:

Although Congress has amended the OT statute to encourage wider use OTs, DoD has continued to use OTs sparingly. Based on the researcher's professional experience, institutional resistance to using OTs can be traced to path dependence and positive feedback mechanisms such as low leadership support and employee risk aversion and habit. The numbers and variety of OTs at some DoD organizations, however, indicate that institutional change is occurring, and this may lead to a critical juncture or policy tipping point, resulting in wider use of OTs across DoD.

Several terms in the research hypothesis merit further explanation. In the context of the study, risk aversion generally means that an employee is reluctant to try new procurement processes such as OTs because new processes are perceived as risky. For instance, the FAR and DFARS provide long-established procurement regulations that cover virtually every potential

aspect of the traditional procurement agreement negotiations and administration process. The FAR and DFARS do not apply to OTs, and employees may perceive OTs' lack of regulatory guidance as a source of risk. Also, OTs are perceived as risky because an employee can suffer adverse career consequences—for example, not be promoted or get an otherwise scheduled pay raise—if an OT the employee works on fails. More bluntly, employees are risk averse to try OTs because they fear negative career repercussions against them if the OT fails.

Chapter 4 discusses that several of the study participants also stated that there is a “risk culture” in DoD, and that this culture inhibits employees from trying anything new. The interpretation section in Chapter 6 discusses this in terms of “risk-intolerant culture.” In the context of the study, the terms risk culture and risk-intolerant culture refer to the array of mandatory procurement regulations such as the FAR and DFARS, audit organizations such as the DoD IG, and the regimented hierarchical structure of most DoD organizations that, for purposes of the study, influence employees to remain dependent on traditional procurement agreements instead of taking the career risk of trying something new such as OTs. Participants found DoD's risk culture to be a source of employee risk aversion.

In the context of the study, the term habit means an employee's long-established work routines and patterns of behavior. For example, contracting officers are habituated to depend on the FAR and DFARS for guidance on all contracting matters. Employees are habituated to rely on standardized contract formats and automatic contracting writing systems. Such habits generally do not apply to OTs since the FAR and DFARS are inapplicable and there are no widely available OT templates or an OT automatic writing system.

Research Question and Interview Questions

The study's research question is:

Why, despite their reported administrative advantages, are OTs only sparingly used by DoD compared to administratively more burdensome traditional procurement agreements?

To answer the research question, the study uses the following main interview questions:

1. What do participants believe are institutional and other factors that influence the decision to use an OT instead of a traditional procurement agreement?
2. What do participants believe are the advantages of OTs compared to traditional procurement agreements?
3. What do participants believe are the disadvantages of OTs compared to traditional procurement agreements?
4. What do participants believe explains DoD's relatively low use of OTs compared to traditional procurement agreements?
5. What do participants believe are factors that could be changed to result in wider use of OTs?

Appendix E provides several subsidiary interview questions for each of these main interview question. Significant findings for the subsidiary interview questions are used to provide major findings for the main interview questions. The interview questions, in aggregate, are used to provide an answer to the research question.

Ontological and Epistemological Framework

To help develop a reliable research design for answering the research question the researcher selected an ontological and epistemological framework for the study (Bloomberg, M., 2008). Based on the selected ontological and epistemological framework, the researcher then selected the research method for the study (Bloomberg, M., 2008). Consistent with the research design literature, the study tries to match the research question with the research design to improve the accuracy of inferences made from data collected during the study (Bono & McNamara, 2011). Thus, a threshold consideration is whether to use a positivist oriented or non-positivist oriented research design.

As discussed in Chapter 2, most studies of the DoD OT program have been qualitative studies that use interviews or the prior OT literature to discuss the pros and cons of OTs or potential metrics for measuring OT program success. The researcher found only one quantitative study of OTs, and the study's quantitative method summarized the percentages of traditional and nontraditional contractors in the DoD OT program based on DoD annual reports to Congress (Hanson, 2005). The researcher could not locate any database or another unclassified source of quantitative data that would support making reliable and useful statistical inferences about the DoD OT program. The shortage of quantitative data about the DoD OT program probably accounts for the qualitative nature of most OT literature the researcher reviewed.

Following this literature, the study uses qualitative methods and adopts a non-positivist ontological viewpoint. The case study method is combined with qualitative interviews DoD officials and contractors at selected DoD organizations. Two case studies that investigate ongoing OTs are used to corroborate data collected from these interviews. Based on the

researcher's professional experience working with OTs, the general ontological viewpoint used in the study is interpretive. The study adopts the interpretive view that the world, here that the DoD OT program is socially or discursively constructed (Marsh, 2002).

The study embraces ontological realism in recognition that the world exists independent of the researcher's knowledge; that social phenomena and structures in the DoD OT program have a separate existence from the researcher (Marsh, 2002). The study's epistemology also recognizes that there is a difference between what could be observed, for instance, through the interviews, and what the researcher may could not or did not see, for example, congressional staffers' influence on the DoD OT policy (Marsh, 2002). Thus, from the viewpoint of ontological realism, the study attempts to make inferences as the best explanation to answer the research question, recognizing that there may be a difference between the reality of the DoD OT program and the appearance of it discovered through the study's field research. This approach seems proper because the study takes a longitudinal snapshot of the DoD OT program—namely, by interviewing only 30 participants at selected DoD organizations and OT programs. The DoD OT program is, of course, much larger than this, and this tempered the researcher's ontological viewpoint.

The researcher is interested in answering a specific, practical research question about an ongoing DoD program. Thus, the study adopts a pragmatist epistemological approach when making inferences to help answer the research question. Pragmatism is an epistemological worldview that arises out of the practical concern with finding solutions to problems and using all available approaches to answer the problem (Creswell, 2014). Consistent with this epistemology, the study faces the practical concern of answering why DoD has not used OTs more widely.

Ansell (2011) applies the principles of pragmatism to large-scale institutional change, finding that large-scale institutional change results from evolutionary learning on a large scale (Ansell, 2011). Large-scale institutional change results from an accumulation of many small incremental institutional changes, and by studying and trying to understand these minor changes, researchers can find the top-down and bottom-up institutional processes that shape the direction and magnitude of institutional change (Ansell, 2011). Ansell's discussion of pragmatism and large-scale institutional change seems applicable to the study and therefore influenced the researcher to design the study to answer a specific pragmatic question about the DoD OT program.

Thus, consistent with ontological realism, and with Ansell and Creswell's pragmatist epistemology, the study recognizes that the DoD OT program exists independently from the researcher or the study. But at that same time, the study is mindful that the program is part of the larger institutional system—the DoD procurement system—that has taken decades to develop. While the study is focused on answering the research question, it is also sensitive to the rich institutional setting in which the research is being conducted. Ansell's application of pragmatism to large-scale institutional is consistent with the study's research question and influenced the researcher's decision to adopt a pragmatist epistemology to shape the research design and to guide the field research. Therefore, the framework for the study is tempered by a worldview grounded on ontological realism and follows the epistemology of pragmatism.

Research Methodology

The researcher uses qualitative research methods for the study. Qualitative research methods are proper where the concept or phenomena needs to be explored and understood and where there is little prior research on the subject (Creswell, 2014). These precepts seem applicable to the study. A qualitative research design is also appropriate when the researcher does not know critical variables to examine. There are few studies using historical institutionalism that have used quantitative methods. The researcher decided that a qualitative research design allowed more flexibility in scoping the research question and carrying out the study than using quantitative methods. For example, by using a qualitative research design, the researcher learned that causal process tracing and comparative case studies could be a useful method for conducting future research of the DoD OT program.

There are practical barriers to using a quantitative research method. For example, the researcher could not find any reliable key variables that could be used to construct a trustworthy quantitative research design, for instance, a multivariate regression analysis design based on the recorded numbers of OTs. Study participants discussed that the existing system used to track OTs—the Federal Procurement Database System–Next Generation (FPDS)—is unreliable because DoD organizations do not consistently use it, and because the database does not accurately account for each individual OT project award made under consortium OTs.

Therefore, the decision to use qualitative methods was motivated by the exploratory nature of the study and by the lack of reliable variables, such as reliable FPDS data, to support a quantitative research design.

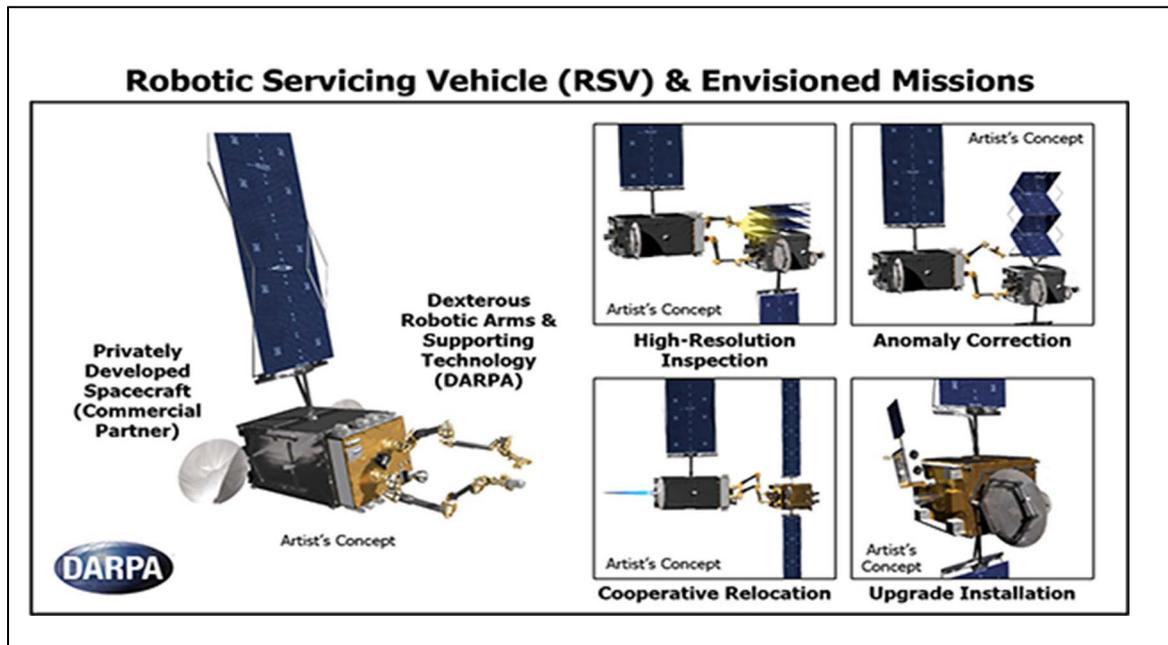
Research Design

To help answer the research question, the study uses multiple data sources, including qualitative interviews, case studies, and qualitative document review. The study includes a research sample comprising 20 participants from DoD organizations that are involved in the DoD OT program. Ten more participants were interviewed for the OT case studies discussed below. Thus, the study's research sample consists of 30 participants. These participants were located at several DoD organizations across the nation and included several contractors.

OT case studies

The two OT case studies are an important part of the research design since they are used for triangulating the organization interview data and to improve the internal and external validity of the study. The OT cases studies involve DARPA OTs for advanced technology research programs that may potentially have major impacts on national defense and the private sector. For the first case study, the researcher selected an OT awarded to a traditional contractor for the DARPA Robotic Servicing of Geosynchronous Satellites (RSGS) program. Under the RSGS program, DARPA will develop, launch, and test a pioneering robotic servicing vehicle that will autonomously service military and commercial satellites in high earth orbit (DARPA, 2017). In operation, the RSGS Robotic Servicing Vehicle (RSV) will enable close-up, autonomous inspection, repair, upgrade, and relocation of satellites in high earth orbit. The following Figure illustrates these four RSV mission capabilities.

Figure 1. Robotic Servicing Vehicle and Four Envisioned Mission Capabilities



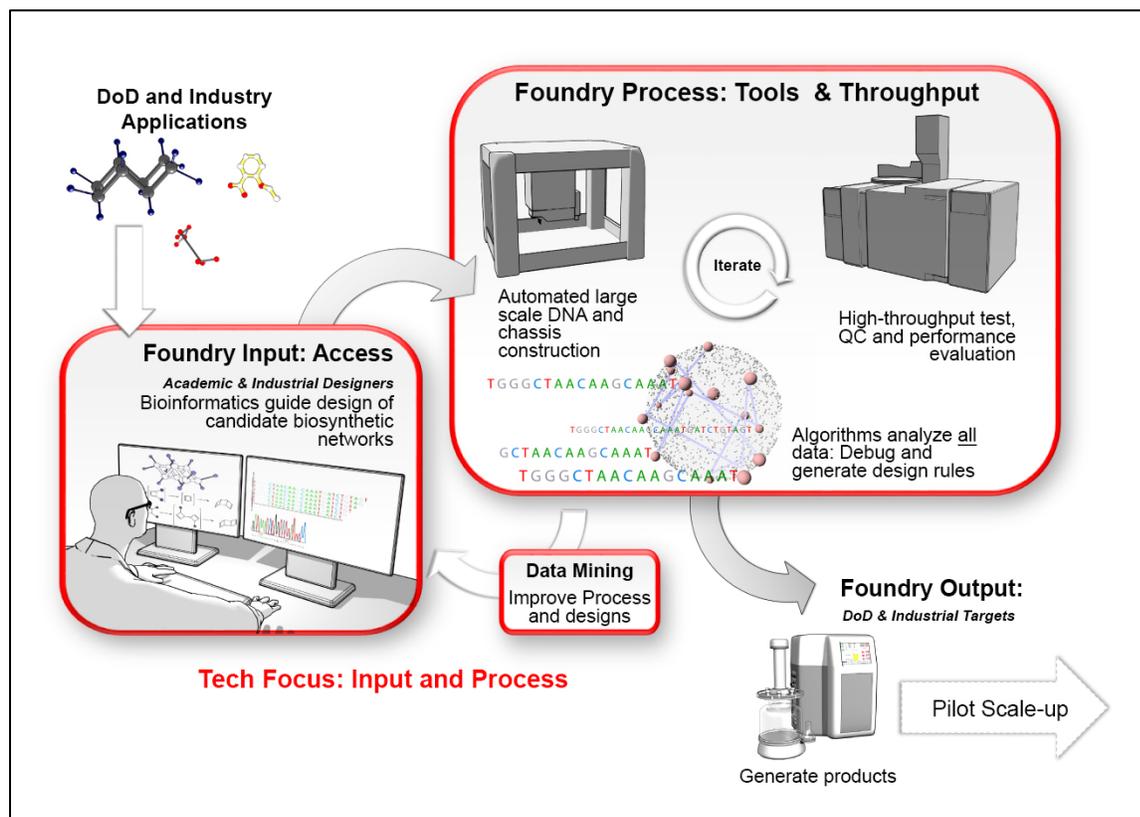
Source: DARPA-PS-16-01 (2016).

When deployed in high earth orbit, the RSGS capabilities will provide military planners and the commercial satellite industry with novel capabilities to service and upgrade satellites that otherwise would be degraded or inoperable due to damage, breakdown, or other events that can degrade or disable satellites in outer space. Thus, RSGS will provide revolutionary new capabilities to service and maintain high-value military and commercial satellites in orbit, thereby extending the service life of these critical national security and commercial assets.

For the second case study, the researcher selected OTs awarded to two nontraditional contractors as part of the DARPA Living Foundries program. Under the Living Foundries program, DARPA will design tools and manufacturing processes that will enable the nation to achieve adaptable, scalable, and on-demand production of militarily and commercially valuable molecules (Living Foundries, 2018). The Living Foundries program attempts to transform bio manufacturing of such molecules into an established commercial industry that can support

national defense mission needs. The following Figure illustrates the envisioned processes for identifying and producing these molecules.

Figure 2. Process for Producing Molecules for DoD and Commercial Industry Applications



Source: DARPA-BAA-13-37 (2014).

Note: Living Foundries program focus areas are outlined in red.

By funding development of new biological manufacturing technologies, DARPA is seeking to create a first-of-its-kind infrastructure comprising tools and processes to help innovation across several applications and helping push biotechnology forward (Keller, 2013). The Living Foundries program is trying to develop a prototype of the building blocks for future biological engineering systems. Thus, with the Living Foundries program, DARPA is trying to establish a new bio manufacturing industry.

To answer the research question, the researcher collected: 1) contextual information; 2) demographic information; 3) perceptual information, and 4) theoretical information.

Contextual information comprises the organizational structure, mission, and history of the DoD organization for participants in the study. Demographic data includes relevant information about each of the participants, including information such as their job title, professional experience, the level of contracting authority (warrant) and experience with OTs. Perceptual information is the interview data. Theoretical data is the literature review.

As mentioned, the study uses qualitative methods and a case study approach. Appendix F provides a flowchart of the research design cross-referenced to the dissertation chapters. The study uses several methods of data collection, including interviews and OT case studies. Semi-structured interviews are the primary method of data collection for the study. The main purpose of the interviews is to gather data to help answer the research question. The researcher uses the OT case studies to triangulate the organization interview findings. Using the comparative case study method of Beach (2016) and Yin (2009), the researcher conducts two OT case studies to corroborate the interview data and to improve research inferences about institutional factors relevant to answering the research question (Yin, 2009, Beach & Pederson, 2016). During this process, the researcher identified potential causal mechanisms that could be useful for future research.

Consolidated major findings and potential causal mechanisms

The study derives consolidated major findings and potential causal mechanisms to answer the research question and to support future research. This section introduces these

elements of the research design. Based on analysis of interview data, the study derives major findings for the organization interviews and for each of the case studies. The major findings for the organization interviews and the case are covered in Chapters 4 and 5, respectively. For example, the following Table summarizes the major findings for Interview Question 1 for the organization interviews and the two OT case studies.

Table 6. Major Findings for Interview Question 1

Dissertation Chapter/Data Source	Major Findings for Interview Question 1
4/Organization interviews	Organizations select OTs instead of traditional procurement agreements because OTs help them field new advanced technology capabilities and to do business with nontraditional contractors. The success of OT negotiations is influenced by joint factors such as the parties' prior experience with OTs, mutual trust and open communication, being flexible, and understanding the other party's legal and business needs.
5/RSGS OT Case Study	OTs offer flexibility to draft OT terms and conditions to meet the needs of the parties. OTs offer the government the ability to accept funding from the OT contractor. OTs offer contractors flexibility to use commercial instead of FAR terms. The parties must give and take and reach consensus on important terms and conditions for OT negotiations to succeed. Mistrust between the parties can be a source of OT negotiation failure. Both sides must have people educated about OTs.
5/Living Foundries OT Case Study	OTs enable the government to work more effectively with nontraditional contractors. OTs enable enhanced communications and information sharing during OT negotiations. The amount of prior experience that a contractor has with OTs can impact whether OT negotiations succeed.

Sources: Chapters 4 and 5 and Appendices BB, DD, and EE.

For triangulation and future research purposes, the major findings are used to derive corresponding potential causal mechanisms. Triangulation and future research are discussed in Chapter 6. For example, the following Table shows the potential causal mechanisms for Interview Question 1. These potential causal mechanisms are derived from the major findings in Table 6 above.

Table 7. Potential Causal Mechanisms for Interview Question 1

Organization Interviews: Potential Causal Mechanisms	RSGS OT Case Study: Potential Causal Mechanisms	Living Foundries OT Case Study: Potential Causal Mechanisms
<ol style="list-style-type: none"> 1. DoD seeks to do business with nontraditional contractors 2. The parties have prior experience with OTs 3. The parties want mutual trust during agreement negotiations 4. The parties want open communications during agreement negotiations 5. The parties want flexibility during agreement negotiations 6. The parties seek to understand each other's needs during agreement negotiations 	<ol style="list-style-type: none"> 1. The parties want flexible agreement terms and conditions 2. DoD wants to accept funding from the contractor 3. The parties want consensus in agreement negotiations 4. The parties mistrust each other, impacting OT negotiations to fail 5. The parties have personnel educated about OTs 	<ol style="list-style-type: none"> 1. DoD seeks to more effectively work with nontraditional contractors 2. The parties want enhanced communication during agreement negotiations 3. The OT contractor has prior experience with OTs

Sources: Chapter 4 and 5 and Appendix GG.

The major findings and potential causal mechanisms are combined to prepare consolidated major findings and potential causal mechanisms. For example, the following Table shows consolidated major findings and potential causal mechanisms for Interview Question 1. It reflects consolidating the information in Tables 6 and 7 above.

Table 8. Consolidated Major Findings/Potential Causal Mechanisms for Interview Question 1

Consolidated Major Findings	Consolidated Potential Causal Mechanisms
<ul style="list-style-type: none"> i. DoD organizations select OTs instead of TPAs to help field advanced technology capabilities and to work with nontraditional contractors ii. OTs offer flexible terms and conditions, for instance, the government can accept funding from the contractor iii. Successful OT negotiations depend on the parties' prior experience with OTs, mutual trust, open communications, flexibility, and understanding each other's legal and business needs 	<ul style="list-style-type: none"> • DoD organization seeks to do business with nontraditional contractors • The parties want flexible terms and conditions during agreement negotiations • The parties have prior experience with OTs • The parties want mutual trust during agreement negotiations • The parties want open communications during agreement negotiations • The parties seek to understand each other's needs during agreement negotiations

Sources: Chapter 6 and Appendix HH.

In aggregate, the consolidated major findings for the five main interview questions provide an answer to the research question. The consolidated major findings and the answer to the research question are discussed in Chapter 6. These, along with the related conclusions and recommendations discussed in Chapter 7, are probably the most valuable takeaways from the study for OT practitioners in the DoD OT program. The synthesis of the consolidated major

findings using the concepts of historical institutionalism in Chapter 6, and the conclusion and recommendation to conduct future research of the DoD OT program discussed in Chapter 7 are probably the most valuable takeaways for policymakers.

Software tools used to help the research

Besides Microsoft Office, the study uses the following software tools to support the research:

- Dragon Naturally Speaking version 5.0.5 was used to dictate field notes during the interviews and case studies and to prepare abstracts of documents reviewed during the literature review.
- Bookends for Mac version 13.1.1 was used as the study's citation management software. Bookends was also used to store electronic copies of research source materials and abstracts.
- MaxQDA version 12.3.5 was used to aid the researcher in analyzing interview transcripts and field notes data. MaxQDA was also used to store electronic copies of participant interviews remarks and the researcher's field notes.
- Grammarly, a web-based commercial editing tool, was used to help the researcher with editing the study data and proofreading the dissertation. Grammarly was also used to check the dissertation for plagiarism and to make sure that all source material was cited correctly.
- ProWritingAid, another web-based commercial editing tool, was used to help the researcher with editing the dissertation. ProWritingAid was used to double-check the dissertation for plagiarism.

Initial Assumptions

A researcher's professional experience provides a suitable basis for making assumptions about the research design in a qualitative case study (Kickert & Van der Meer, 2011). Thus, based on the researcher's professional experience with OTs and the preliminary literature review, the study makes the following initial assumptions about the DoD OT program:

First, OTs are a useful type of non-procurement agreement that could be more widely used by DoD. This assumption is based on the review of the OT literature and the legislative history of OTs, both which show that OTs have been successful at attracting traditional and nontraditional contractors to do business with DoD and in delivering innovative technologies to DoD that would not otherwise have been available through traditional public procurement agreements.

Second, it would be beneficial for DoD to more widely use OTs. Wider use of OTs would help DoD more effectively tap into private industry expertise and technologies to develop and deliver advanced technologies for defense needs. This assumption is based on the review of the OT literature and the legislative history of the OT statute.

Third, Congress has amended and expanded OT authority to encourage DoD to more widely use OTs. So, the study assumes that there are no legislative barriers to wider DoD use of OTs. This assumption is based on a review of the legislative history of the OT statute, which showed that Congress had amended the OT authority to expand its scope to encourage wider use of OTs by DoD.

Fourth, DoD organizations understand relevant DoD OT policy, and these organizations are not avoiding the use of OTs. Thus, the study also assumes that DoD organizations are

interested in more widely using OTs. This assumption is based on DoD policy support for OTs and the professional training that most of the DoD procurement and programmatic workforce is required to take to keep their professional credentials.

Fifth, there are no major institutional barriers for DoD organizations to get OT authority delegated to them by their chain of command. This assumption is based on the researcher's professional experience in the DoD OT program.

Sixth, DoD program and procurement officials understand major pros and cons of OTs compared to traditional procurement agreements. This assumption is based on recent DoD policy emphasis on finding new ways to deliver technology solutions for warfighters (DOD(AT&L), 2015).

Seventh, DoD employees have sufficient professional training and experience to know how to negotiate and administer an OT, or if they do not, such training is readily available to them. This assumption is based on that there is a published DoD OT Guide, which was recently updated in 2017. This assumption is also based on the researcher's experience that many terms and conditions in OTs are modeled on FAR and DFARS clauses used in traditional procurement agreements and that DoD procurement officials are familiar with these clauses.

Eighth, the study assumes the orthodox (homeostatic) model of policy change applies to the DoD OT program (Howlett, 2009). Under the homeostatic model, only paradigmatic change creates new policies, and the source of such change is exogenous to the institution (Howlett, 2009). Absent paradigmatic change, policy change is only incremental. This assumption is based on a review of the historical institutionalism literature and the researcher's professional experience in the DoD OT program.

The Researcher

At the time of the study, the researcher was employed as a DoD attorney at DARPA. This organization is a DoD leader in OTs. Thus, the researcher brings to the study about eight years of experience as an attorney at a DoD R&D organization that negotiates and administers OTs. The researcher sometimes has a significant role in this process.

The researcher understands that the same professional experience that helped in providing research insights during the study also acted as a liability, potentially biasing his judgment about how the study was conducted and interpreting its findings. The researcher's legal background biases him towards interpreting findings from a legal perspective, although the study will discuss several other perspectives valuable in understanding the study's findings. For example, the study provides insights into the institutional factors that were relevant to interpreting the study's findings, but that is not related to legal matters about OTs.

With these caveats in mind, the researcher conducts the study with a commitment to engage in an ongoing and critical self-reflection of potential personal biases that might impact the study's findings. The researcher maintained a research journal. The researcher made sure that the participants reviewed their interview transcripts for accuracy. The participants were asked to suggest OTs for the case studies, and the case studies were selected from the list of these OTs. The data analysis methods discussed in Chapter 3 additionally reflects concerns about researcher bias during this critical part of the study

Ethical Considerations

The researcher is attentive to ethical considerations. A primary ethical concern was ensuring informed consent of the participants and that participant data remains confidential. Virginia Tech Institutional Review Board (IRB) approved the study. Appendix G provides a copy of the IRB approval documentation. Participants were required to give written informed consent before taking part in interviews or completing OT case study forms. Using the consent form approved by the Virginia Tech IRB, the researcher made sure that participants properly completed an informed consent form. The researcher also made sure that participants knew the study purposes and how they might contribute to the study. The researcher provided each participant with a brief overview of the study. Appendix H provides the brief overview of the study.

Participants were also informed that their participation would remain confidential and that their name would not be used in the study's findings. Thus, confidentiality of data was another ethical consideration in the study. Electronic data was stored in two locations. First, some electronic data, for instance, interview transcripts, was temporarily stored on the researcher's workplace computer. The computer includes an encrypted hard drive and is protected by substantial firewall processes. Electronic data was stored in several file folder on the encrypted hard drive.

Second, electronic data is stored on the researcher's personal computer. This computer is protected by a firewall and includes an encrypted drive. The researcher did not save significant amounts of participant data in hard copy format. Most hard copy data were scanned to electronic data and stored in the researcher's computer. Some hard copy data, for instance, rough versions

of field notes and handwritten consent forms, were temporarily stored in a locked area at the researcher's workplace.

Third, the study strictly avoids plagiarism. All research source material used in the study are cited following the American Psychological Association (APA) publication and Virginia Tech Electronic Theses and Dissertation (ETD) guidelines (APA, 2010; Virginia Tech, 2017). The researcher kept hard copies of all source materials used in the study, including research notes based on the researcher's review of source materials. The researcher used web-based plagiarism checkers (Grammarly and ProWritingAid) to periodically examine the draft dissertation to make sure it appropriately cited all research source materials. To verify its originality, the dissertation was also reviewed using Virginia Tech's iThenticate software.

Chapter 2–Historical Institutionalism and the DoD OT Program

Purposes of the Literature Review

This chapter provides the literature review for the study. The literature review is used to help answer the study's research question, which is: Why, despite their reported administrative advantages, are OTs only sparingly used by DoD compared to more administratively burdensome traditional procurement agreements?

The literature review is also used to help investigate the study's research hypothesis, which is: Although Congress has amended the OT statute to encourage wider use OTs, DoD has continued to use OTs sparingly. Based on the researcher's professional experience, institutional resistance to using OTs can be traced to path dependence and positive feedback mechanisms such as low leadership support and employee risk aversion and habit. The numbers and variety of OTs at some DoD organizations, however, indicate that institutional change is occurring, and this may lead to a critical juncture or policy tipping point, resulting in wider use of OTs across DoD.

There are five main interview questions related to the research question. Appendix E provides the main interview questions and the corresponding subsidiary interview questions. The interview questions were used to gather data for answering the research question. As discussed below, the literature review performed several purposes related to the interview questions and the research question. The literature review also assisted in preparing the predetermined coding scheme and the conceptual framework for the study. The conceptual framework is discussed at the end of this chapter. The coding scheme is discussed in Chapter 3

as part of the discussion of the study's research design and methodology. The coding scheme is additionally discussed in Chapter 4 to explain the emergent sub-codes.

The literature review serves several purposes related to the prior literature. First, the literature review helps the researcher define and scope the research problem. McNabb (2008) observes that a literature review involves reading and analyzing published materials and books, professional and academic journals, government documents, and other sources, and that the focus of the literature review is to find key ideas and findings that lead to further investigation (McNabb, 2008, p. 74). Thus, the researcher uses the literature review to find key ideas and findings about OTs that could lead to further investigation. The researcher also used the literature review to suggest new ways of scoping the research, for instance, to find what DoD employees were interviewed by prior studies of the DoD OT program. Based on the review of prior literature about the DoD OT program, the researcher was able to interview participants at DoD organizations that had not participated in prior studies involving the DoD OT program.

Another purpose of the literature review is to situate the study within the broader context of the prior literature. Bloomberg (2012) finds that the literature review involves the systematic identification location and analysis of material related to the research problem (Bloomberg & Volpe, 2012). In what Bloomberg calls an integrative literature review, the researcher reviews, critiques, and synthesizes the representative literature on the topic such that a new framework and perspective on the topic is generated. Thus, the researcher tries to conduct an integrative literature review to critically analyze prior literature and to generate new perspectives on it.

According to Bloomberg, by conducting an integrative literature review, a researcher can find gaps in the prior literature where useful research may be conducted. Thus, consistent with Bloomberg, another purpose of the literature review is to find gaps in the prior literature that

where useful research could be conducted. As discussed below, the literature review enabled the researcher to find several gaps and propose contributions that the study could make in bridging those gaps.

Creswell (2014) identifies that a purpose of the literature review is to provide a framework for establishing the importance of the study and a benchmark for comparing the results with other findings (Creswell, 2014). Dissertation literature reviews are shaped from a larger problem to a narrow issue that leads into the methods of the study. Thus, following Creswell, the researcher attempts to develop the literature review for the study as a method for framing and shaping larger policy issues such as policy change to the narrower issue of endogenous institutional change within the DoD OT program. The literature review also informs the study's research design.

Consistent with McNabb, Bloomberg finds that a significant purpose of the literature review is to figure what has already been done related to the study topic. This prevents a researcher from duplicating prior research. It also enables the researcher to gain an understanding of the topic, about what is already done and how ideas related to the study topic have been applied to develop key issues surrounding the topic. Bloomberg notes that the literature review is useful for finding critiques about the study topic. A good literature review allows the researcher to get a grip on what is known and to learn what has been already researched in the current body of knowledge. Following this guidance, the study's literature review is used to find what has already been written about the DoD OT program to make sure that the study did not duplicate the results of prior studies. Thus, the literature review helps distinguish the study from prior studies of the DoD OT program.

Jensen (2015) explains that an added purpose of the literature review is to summarize the historical background of the topic and to compare and contrast the schools of thought of an issue (Jensen, 2015). A literature review should synthesize available research and critique the prior literature. Jensen suggests that the literature review should critique research methods, note areas of disagreement, and highlight gaps in the existing research to justify the topic that is planned for investigation. The study's literature review attempts to, where proper, note areas of disagreement in the prior literature, critique the prior literature, and highlight gaps in prior research to justify the study.

Bloomberg also emphasizes that synthesis is key to a useful literature review. By synthesis, Bloomberg means that the literature review should not only report claims and hypotheses made in the existing literature but also to examine the research methods. This helps the researcher understand whether the claims are warranted. Such an examination of the prior literature enables the researcher to distinguish what has been learned by prior scholars and what still needs to be learned and accomplished. In this manner, Bloomberg discusses that the researcher should be able to write a literature review that synthesizes the prior literature in a way that permits a new perspective. The new perspective forms the basis of a study that can contribute to the previous literature. The literature review should be the basis of both theoretical and methodological sophistication and should improve the quality and usefulness of research. Following Bloomberg, each of the two literature topics discussed below concludes with a section that synthesizes the literature reviewed.

Although there are many advantages of using prior literature in a qualitative study, there are also some disadvantages. Tummers (2011) discusses that there can be pitfalls in using literature in a qualitative study (Tummers & Karsten, 2011). For example, during the research

design phase overreliance on prior literature can blind a researcher to unique social phenomena presented by the study at hand. During the data collection phase, a researcher may be biased to collect only data that are relevant according to the prior literature. In addition, during the data analysis phase, the prior literature can cause barriers to the researcher making fresh insights and recommendations. Thus, a thorough research design should show how the potential pitfalls of using the literature would be avoided. During data collection and analysis, the role of literature and its influence on the development of the research and its result should be reviewed. Tummers concludes that the researcher should include a thorough explanation and justification for literature used in the various phases of the research report.

The study tries to avoid these pitfalls. The literature review attempts to synthesize the prior literature by examining the claims, hypotheses, and methodologies used in the prior literature. It tries to distinguish what has been learned in each area of study, in the DoD OT program and in historical institutionalism literature, and to figure what still needs to be learned and accomplished. Thus, a goal of the literature review is to find a new perspective on the DoD program that could help answer the research question. Based on the pitfalls discussed by Tummers, the researcher attempts to distinguish the study from the prior literature, including justifying how the literature is used in various stages of the study. Each of the literature topics below concludes with a synthesis section that attempts to follow Jensen's and Bloomberg's teachings on synthesizing the prior literature.

Practical Concerns

The literature review also addresses several practical concerns. For instance, the literature review helped the researcher carry out thorough research. The researcher conducted a literature review to understand what previous studies about the DoD OT program and historical institutionalism have found. Thus, a thorough literature review was a predicate step to help the study contribute to the existing body of literature on the DoD OT program.

The literature review also helps the researcher to find and flesh out the primary literature topics. McNabb (2008) notes that a literature review can trace how different schools of thoughts have emerged. These aspects of a literature review seemed relevant to the study. The DoD OT program has evolved over the last several decades and involves several key stakeholder groups—for instance, stakeholders at different DoD organizations and the Pentagon. The historical institutionalism literature is richly developed and offers a variety of theoretical perspectives on how institutional development is shaped by historically related factors. The literature review enables the researcher to find relevant scholarship in two different disciplines—OTs and historical institutionalism.

The researcher makes sure that the literature review is not just a chronological rehash of prior studies. A literature review is a process that summarizes books, articles and other literature, provides a critical evaluation of each scholarly work, and provides an overview of the significant research published on the study topic (Jensen, 2015). Thus, the researcher tries to conduct a literature review that is not just a rote summary of articles considered. Instead, the literature review seeks to offer a critical evaluation and interpretation of each scholarly work, and in aggregate, to offer a useful review of the significant literature published on the topic

selected for research. As discussed below, the literature review is organized by subtopics and ideas to provide a useful review of the literature topics.

Two Literature Topics: OTs and Historical Institutionalism

The literature review that follows discusses the research question in the context of two major areas of literature (topics). The first topic is literature about OTs. This literature helps the researcher understand what studies by institutional organizations such as the GAO and the DoD Inspector General (DoD IG) have reported about DoD's OT processes. This literature covers White House and DoD policies relevant to the OTs. From a practitioner perspective, this literature helps illuminate how procurement attorneys, contracting officers, program managers and other commentators have assessed the DoD OT program.

The second topic is historical institutionalism. This literature helps the researcher understand what institutional factors may impact path dependence and endogenous change in national and sub-national policy systems. This literature also assists in understanding what common factors drive the formation of critical junctures, positive feedback mechanisms, and endogenous institutional change in policy domains that have been studied using historical institutionalism. Since historical institutionalism is an established field of public policy scholarship, this literature also helps the researcher connect the DoD OT program to the broader universe of public policy research.

As discussed below, the researcher found no OT literature or DoD OT program documents that attempts to link OTs to historical institutionalism. Thus, historical

institutionalism scholarship is a useful source for gleaning new theoretical insights that were useful to answering the research question and for developing policy recommendations.

Other Literature Topics Considered

The researcher considered three other potential literature topics. These topics are the policy diffusion literature, the organizational change literature, and the public procurement of innovation literature. This section briefly summarizes these literature topics and explains why the researcher decided not to use them as literature topics for the study.

Policy diffusion literature

The researcher initially considered using the policy diffusion literature as a literature topic for the study. Policy diffusion is defined as a process where policy choices in one unit are influenced by policy choices in other units (Maggetti & Gilardi, 2016, p. 92). The traditional view of policy diffusion assumes that diffusion is primarily related to geographic proximity, and so a new policy diffuses from one jurisdiction to geographically adjoining jurisdictions, resulting in geographic clustering of the new policy (Shipan & Volden, 2012). But recent policy diffusion studies recognize factors other than geographic proximity that account for policy diffusion (Karch, 2007). Modern scholarship identifies three additional diffusion mechanisms: emulation, learning, and competition (Maggetti & Gilardi, 2016). A fourth mechanism, coercion, is also sometimes recognized as a mechanism (Marsh & Sharman, 2009).

Emulation policy diffusion means copying socially proper policies; learning policy diffusion means being influenced by successful policies of other policymaking agents; and competition diffusion means following the policies of competitor policymaking agents (Magetti & Gilardi, 2016, p. 92). Coercion is force, threats, or incentives by one policymaking agent that are meant to impact the decisions of another policymaking agent (Shipan, 2012, p. 791). In recent studies, combinations of these mechanisms have been recognized as contributing to the spread of a policy through policy diffusion (Shipan and Volden, 2012).

From a research methods perspective, Event History Analysis (EHA) is a quantitative method that is frequently used to analyze the impact of policy diffusion mechanisms (Sabatier & Weible, 2014). EHA is the statistical analysis of a longitudinal record of when a discrete event (e.g., adoption of a policy) happens to an individual or group (Tyran & Sausgruber, 2005). Overall, the policy diffusion literature seemed to have a helpful mix of theory-based qualitative research, along with case studies, quantitative-based articles, and literature surveys.

There were several reasons the researcher did not select the policy diffusion literature for the study. First, using the policy diffusion literature would have required the study to assume that policy diffusion is occurring in the DoD OT program. This seemed inconsistent with the exploratory nature of the study. Moreover, there is very little DoD OT policy to diffuse.

Second, while DoD organizations may be imitating and learning about OTs from other DoD organizations, there does appear to be a clear policy threshold indicating when a DoD organization adopts OTs as a policy. Third, the use of OTs across DoD does not seem to be driven by standard diffusion mechanisms. For instance, DoD organizations are probably not being coerced to use OTs, nor are DoD organizations using OTs to compete with other DoD organizations. And combining the policy diffusion mechanisms—for instance, combining the

emulation and learning diffusion mechanisms—did not seem helpful in answering the study’s research question. So, the researcher decided not to select policy diffusion as a literature topic.

Organizational change literature

The researcher also initially considered using the organizational change literature as a literature topic for the study. This literature seemed potentially useful because the research hypothesis theorizes that change is occurring at some DoD organizations. The researcher reviewed major organizational change models and theories. Kezar (2001) provides a good overview of the major models of organizational change. For each model, Kezar summarizes its assumptions, examples, key activities and individuals, and processes. Lewis (2012) provides added insights into the evolutionary model (Lewis & Steinmo, 2012). Kezar finds that each of the major change models suffers weaknesses in explaining organizational change. The following Table is based on the researcher’s review of Kezar and Lewis and summarizes why each organizational model was not used for the study.

Table 9. Organizational Change Models Not Used for the Study

Organizational Change Model	How the Model Views Institutional Change	Why Not Used
Evolutionary	Institutions change in a manner akin to biological evolution	Deemphasizes the impact of employee behavior on change. Employee behavior may be an important factor in answering the study’s research question
Teleological	Institutional change occurs because leaders or other	Emphasizes the roles of change leaders/change agents

	institutional actors lead change	in causing institutional change. It is unclear whether leaders are leading change in the DoD OT program
Lifecycle	Institutions have life cycles akin to the lives of people, and thus institutions change through learning and adaptation	Emphasizes discrete stages of institutional development. The model did not seem to reflect the historical dynamics of the DoD OT program
Dialectical	Institutions change because of internal political conflict	Conflict does not seem to be a major source of change in the DoD OT program
Social Cognition	Institutional change occurs because of institutional learning	Institutional learning may be just one of many mechanisms causing change in the DoD OT program
Cultural	Institutional change occurs as a result of changes in institutional culture	Culture may be a major source of institutional stasis, not change, in the DoD program. Culture, like institutional learning, may be just one of many change mechanisms in the DoD OT program

Sources: Kezar (2001) and Lewis (2012).

Kristsonsis (2004) provides the researcher with a useful overview of established organizational change theories (Kristsonis, 2004). Kristsonis compares the characteristics of Lewin's three-step change theory, Lippitt's three phases of change theory, Prochaska and DiClemente's change theory, social cognitive theory, and the theory of reasoned action and planned behavior to one another. The following Table is a based on the researcher's review of these organizational change theories and summarizes why they were not used for the study.

Table 10. Organizational Change Theories Not Used for the Study

Organizational Change Theory	How the Theory Views Institutional Change	Why Not Used
Lewin's Three-Step Changes Theory	Unfreeze status quo institutional behavior; change institutional behavior; refreeze changed institutional behavior	Oversimplified rational choice view of how institutional change occurs. This type of rational, purposeful change is probably not what is happening in the DoD OT program
Lippett's Phases of Change Theory	Change occurs as a result of seven sequential phases that are carried out by institutional change agents, for example, by institutional leadership	Assumes that change agents are willing to, and can cause institutional change. These assumptions do not necessarily apply to the DoD OT program. For instance, the researcher found little evidence of change agents
Prochaska and DiClemente's Change Theory	Institutional actors cause change by a cycle of contemplation, preparation, action, and maintenance of change	Overemphasizes the role of individuals in causing institutional change. Individual behavior is likely not the primary source of change in the DoD OT program
Social Cognition Theory	Institutional change occurs because of institutional learning; specifically, training	Insufficient training is likely just one of many potential reasons why DoD does not more widely use OTs
Theory of Reasoned Action and Planned Behaviors	Institutional actors cause change by taking positive actions to effectuate change and by having peer support	Overemphasizes the role and capacity of individual employees to cause institutional change. Individuals employees are probably not the primary potential source of change in the DoD OT program

Source: Kristsonsis (2004).

Since the study uses a pragmatist epistemological approach, the researcher also considered the pragmatist view of organizational change. Pragmatism theorizes how organizational change occurs. For example, Ansell (2011) discusses that pragmatism defines institutions as focal points for evolutionary learning. According to Ansell, pragmatists conceive an institution as a going concern, and thus pragmatist institutionalism emphasizes dynamic institutional change (Ansell, 2011). Under the pragmatist view, an institution is not static, but instead is dynamic with ongoing interactions between concepts, experiences, and situations. So, rather than characterizing institutions in equilibrium terms, pragmatism finds they are better understood as continuous processes. This seems similar to the historical institutionalist view of institutional dynamics and consistent with how the institutional dynamics of the DoD OT program.

Pragmatism also theorizes how large-scale institutional change occurs. Ansell explains that large organizational changes build up from the accumulation of many prior small institutional changes. Ansell sees employees as the agents that can spur small-scale institutional changes by engaging in local experimenting. The role of leadership is to cultivate the institution's mission and to encourage an institutional environment conducive to learning. These characterizations of how large-scale change seem to reflect the study's research hypothesis that change is occurring at some DoD organizations and that this will lead to wider use of OTs across DoD. The pragmatist view of the role of leadership in institutional change, however, does not appear to be reflected in the DoD OT program.

The researcher also reviewed Kelman's (2005) seminal book on organizational change in the federal procurement community (Kelman, 2005). Kelman recounts his leadership efforts in the mid-1990s to reform the federal procurement system by initiating changes at the top,

resulting in changes at the working level. By doing so, the federal procurement system changed to embrace competition for contract awards as a new policy standard. Kelman's major claim is that conventional explanations that people resist change are often oversimplified and misleading and thus incomplete. There are institutional constituencies for change as well as for the status quo. By activating and supporting groups of employees that want change, change spreads across the institution. Thus, Kelman argues that change does not need motivated or coerced, it merely needs to be unleashed. Change can be unleashed in two ways: through positive feedback mechanisms and by acceptance through repeated exposure to change. According to Kelman, institutions are difficult to change because change requires learning, and learning is time-consuming and hard. Sticking with established institutional processes is often rewarded; those that promote change are not rewarded. Institutional routines become embedded, leading to path dependency. Conversely, change is risky, and innovation often requires failure.

From a research methods perspective, most of the organizational change literature reviewed was qualitative and focused on the theoretical development of organizational change theory. Kelman's case study of unleashing change in the federal procurement community was a notable exception. But overall, compared to the historical institutionalism literature, the organizational literature was not as helpful from the perspective of offering the researcher research methods or theoretical insights to adopt for the study.

There were several reasons the researcher did not select the organizational change literature for the study. First, the organizational change literature seemed too narrow to help explain why DoD is not using OTs more widely. For instance, this literature does not adequately explain historical sources of mechanisms that may drive institutional development. History seems to have a significant explanatory role in the development of the DoD OT program.

Second, the organizational change literature focuses on the mechanisms explaining how change occurs, but does not systematically account for why change may not be happening. The study's research question is focused on why change has not occurred in the DoD OT program. Third, historical institutionalism accounts for institutional change in a broader theoretical framework than the organizational change literature. For instance, the organizational change does not theoretically develop concepts such as positive feedback mechanisms and critical junctures, which add to the holistic account of institutional development offered by historical institutionalism. Thus, the organizational change literature is narrower and may be redundant of the historical institutionalism literature used by the study.

The study adopts historical institutionalism as a literature topic because it accounts for institutional change within its broader theoretical framework. In contrast, the organizational change literature just addresses change; for instance, Kelman's compelling account of how he led institutional change in the DoD procurement community in the 1990s. Overall, the organizational change literature seems like a narrower, and hence less useful, theoretical framework than historical institutionalism. So, the researcher decided not to select organizational change as a literature topic.

Public procurement of innovation literature

The researcher also considered using the Public Procurement of Innovation (PPI) literature as a literature topic for the study. PPI is defined as the purchase of a solution that is novel to the buying organization to serve organizational needs (Uyarra, Edler, Garcia-Estevéz, Georghiou, & Yeow, 2014). PPI policy is popular in the European Union (EU), and thus this

literature has mostly been developed by EU policy scholars. Relevantly, it has focused on institutional barriers to the procurement of innovation. For instance, a survey of the United Kingdom high technology industry by Uyarra (2014), finds that public sector procurement processes and personnel are significant barriers to PPI (Uyarra, Edler, Garcia-Estevez, Georghiou, & Yeow, 2014). Uyarra also finds that public agency procurement instruments are too restrictive for effective PPI and public procurement must be streamlined to avoid deterring small innovative firms from public procurement.

Other PPI scholars have emphasized the need for institutional change in public agencies to support PPI. For example, in a case study of EU public procurement, Rolfstam (2009) finds that endogenous institutional factors can impact PPI (Rolfstam, 2009). To increase PPI, he recommends changing public institutions, not laws. Following this idea, in a case study that included interviews of innovation managers, Rolfstam and Elmer (2010) note that there are often endogenous institutional barriers to effective PPI (Rolfstam & Elmer, 2011). Rolfstam concludes that a more holistic view of public procurement of innovation is needed, including an appreciation of the role diffusion institutional barriers have an inhibiting effect on the diffusion of innovation.

There is also PPI scholarship devoted to the choice of policy instruments to promote PPI. Borrás and Edquist (2013), for instance, emphasize that the choice of policy instrument is important to effective PPI policy (Borrás & Edquist, 2013). A typology of policy instruments is suggested that includes regulatory, economy, and soft instruments. Soft instruments include voluntary contractual arrangements between the public agency and private firms, and thus soft instruments seemed most similar to OTs. The article concludes that ad hoc choice of soft

instruments leads to no innovation and that the choice of such instruments is often merely based on prior agency practices, not tailored to the specific PPI need.

The PPI literature has identified public sector employees as barriers to PPI. For example, a survey of 800 public sector suppliers in the United Kingdom by Georghiou (2014) finds that public agency employees were perceived as barriers to PPI (Georghiou, Edler, Uyarra, & Yeow, 2014). Lack of procurement expertise was explicitly identified as a barrier. Employee risk aversion is another barrier. Similarly, Edler and Yeow (2016) conduct a case study of two public procurements in the United Kingdom to find obstacles to effective PPI (Edler & Yeow, 2016). The case studies find that public innovation processes were too bureaucratic and complicated. There is also institutional resistance to new technologies.

From a research methods perspective, most of the PPI literature reviewed was qualitative and focused on the theoretical development of PPI. There were several case studies. There was one article that used quantitative methods and one that included semi-structured interviews. But compared to the historical institutionalism literature, the PPI literature was not as helpful from the perspective of offering useful research methods or theoretical insights that could be leveraged for the study.

There were several reasons the researcher did not select the PPI literature for the study. First, the literature focuses on how public agencies can design useful PPI instruments and policies to procure innovation from the private sector. This literature did not seem very relevant to helping the researcher understand why DoD has not more widely used OTs. As discussed in literature topic one below, OTs have their critics. But it is generally accepted that OTs are an effective PPI instrument. Second, while the PPI literature does discuss interesting institutional barriers to PPI such as employee resistance to change and institutional inertia, it does not

theoretically unpack these barriers to a degree that would be helpful to answering the study's research question. Third, research methods are not systematically developed in the PPI literature reviewed. So, the researcher decided not to select PPI as a literature topic.

Sources

To conduct the literature review, the researcher uses four primary sources. First, the researcher used the Virginia Tech library system—the electronic library system available via the Summon database. This source is used to find relevant literature for both literature topics. Keyword searching of titles and abstracts was used to find specific articles pertinent to these topics. The researcher maintained a list of literature sources and keywords searched. Appendix I provides a list of these sources and keywords searched.

The second source is the LEXIS-NEXIS database. This source was used to find documents about the federal OT program, including the DoD OT program. The third source was publicly available internet information; for instance, information on Google Scholar and government websites such as the Congressional Record. These sources were used to collect news media stories and other general information about OTs that helped improve the accuracy and trustworthiness of the study.

The fourth source is the study participants. Participants were helpful in identifying prior literature for the researcher to review. Several participants helped the researcher by suggesting published literature that might apply to the study. Other participants provided scholarly articles, news articles, and DoD information to the researcher. They also provided qualitative documents for the case studies. Thus, the study participants were a valuable source of prior literature.

Scope

Bloomberg (2012) recommends that the literature review should represent the most current work undertaken in the subject area, and that usually a five-year from the present is a suitable coverage for the literature review. A longer time span was proper for the study. The OT statute was enacted in 1989. So, the literature review is generally from 1989 to the present. However, the researcher also reviewed literature published before 1989, for instance, legislative materials that document efforts leading up to passage of the original OT statute.

Because of the nature of the literature reviewed for historical institutionalism, the historical and contextual development of this literature is considered significant, and so this literature is not limited to any timeframe. But the researcher attempts to find important literature that was recently published, for instance, within the last 15 years for this literature topic. The researcher also attempts to locate especially relevant literature that was older than that, for instance, literature linking historical institutionalism with the new institutionalism scholarship of the 1980s.

The literature review spans all phases of the study. Bloomberg (2012) suggests that the literature review should be an ongoing process throughout the various stages of the dissertation. Boote (2015) stresses that the literature review should not be confined to a single chapter in the dissertation. Rather, the literature review should continue throughout the study and the literature should be an integral part of the entire dissertation, from the introduction to the conclusion.

Following this guidance, the researcher attempts to use the literature review to inform each chapter of the study, from the introduction in Chapter 1 to the conclusions and recommendations in Chapter 7. Each of the study's chapters applies relevant prior literature to

make the discussion more informative, trustworthy, and reliable. The researcher updated the literature review several times during the study, for instance, to reflect updated OT policies, the most recent news articles, and the latest GAO information. Thus, the literature review was ongoing throughout the study.

Literature Map and Article Abstracts

Creswell (2014), discusses that a literature map of all literature reviewed should be prepared. The purpose of the literature map is to help the researcher organize and synthesize the literature coherently and persuasively. The researcher maintained a literature map of all significant books, articles, media, and other documents used to prepare the literature review and to conduct the study. Appendix J provides the study's literature map.

Creswell and Bloomberg (2012), suggest preparing abstracts of every article examined for a dissertation. Abstracts consist of overviews of the articles, including the method used, the setting of the study, and their major findings. Following this guidance, the researcher prepared abstracts for most articles reviewed during the study. All article abstracts were stored in the researcher's citation management software program—Bookends for Mac—for convenient retrieval. Appendix K provides two sample article abstracts taken from the study's abstracts data stored in Bookends for Mac.

Review Process

Using the sources and search methodology described above, literature from the two topics was collected and reviewed by the researcher. The researcher attempts to use a consistent analytical framework for reviewing each article. For each article, the researcher prepared an abstract summarizing the purpose, the research methodology used, the research sample, and its findings. The articles for each topic were arranged using the literature map to find key premises and findings of the articles that could help synthesize the literature topics.

Throughout the literature review, the researcher attempts to find gaps in each topic that the study might help to address. For example, since no prior study was found that has reviewed the DoD OT program using historical institutionalism, the researcher focuses on attempting to apply the historical institutionalism literature to the DoD OT program. Each literature topic below concludes with a synthesis of the literature to convey how the articles and documents reviewed informed the researcher and helped contribute to answering the research question.

As discussed below, the literature review is also used to develop the study's conceptual framework. The conceptual framework is used to organize data collected from participants to develop the study's coding scheme. The conceptual framework also aids in interpreting and synthesizing the study's major findings.

Overview of the Conceptual Framework

Bloomberg (2012) recommends that the literature review should culminate in a conceptual framework that posits new relationships and perspectives based on the literature

review. The conceptual framework acts as the scaffolding for a research project and becomes the repository for all data collected during fieldwork. The study's conceptual framework was initially developed using the researcher's professional experience in the DoD OT program. It was further developed using the review of the two literature topics discussed in this chapter. The conceptual framework is used to develop the predetermined coding system for coding qualitative interviews. The conceptual framework is further used to help refine the interview questions and the coding scheme. The conceptual framework is used to organize the study's major findings and guided interpretation and synthesis of these findings. Chapter 3 discusses how the conceptual framework is the central component of the study's two-phase research design. The conceptual framework is presented at the end of this chapter.

Contribution to the Prior Literature

Jensen (2015) finds that the literature review chapter should conclude by explaining how the present study contributes to the prior literature. The study's literature review explains how it contributes to the prior literature. For example, the literature review identifies that there are few historical institutionalism studies of national-level policy system and none of U.S. agency-level procurement programs. The study uses historical institutionalism to investigate an U.S. agency-level procurement program—the DoD OT program.

From the perspective of the OT literature, prior studies of the DoD OT program have not squarely addressed the study's research question. The research question is relevant to an unsolved policy question: Why has DoD not used OTs more widely? The OT literature does not have a clear nexus to the broader field of public policy scholarship. The study relies on public

policy scholarship for its research design and methodology and, using historical institutionalism, for the synthesis of the consolidated major findings.

The study's research design appears to be unique compared to those of the prior historical institutionalism literature. The study's research design is novel compared to the prior OT literature. Thus, the researcher hopes the study can contribute to the prior literature by focusing on a U.S. agency level policy system—the DoD OT program—and by leveraging a novel research design. A synthesis section follows each literature topic and provides additional discussion of how the study may contribute to the prior literature.

Organization of the Literature Review

The two literature topics—OTs and historical institutionalism—are separately reviewed and synthesized. The OT literature is reviewed and synthesized first, and the historical institutionalism literature is reviewed and synthesized second. Discussion for each literature topic is logically broken out by subtopics. Thus, the OT literature review is broken out by subtopics that follow the institutional source of the literature, for instance, White House and DoD literature. The historical institutionalism literature review is broken out by historical institutionalism concepts, for instance, by the concept of positive feedback mechanisms. So, the literature discussion is organized by two literature topics and then by several subtopics within each topic.

Within each subtopic, the literature review is further organized by ideas that tie relevant literature together. For example, in the OT literature review, the White House and DoD literature subtopic discusses the relevant literature in the context of the idea of the need to

harness private sector innovation for national policy objectives. Likewise, in the historical institutionalism literature review, the path dependence subtopic discusses the relevant literature in the context of the idea that institutions are inextricable from their historical context, and so institutional analysis must account for institutional history. The other subtopics are organized in the same manner. Thus, the literature review that follows is organized by subtopics, and within each subtopic by presenting the relevant literature in the context of ideas that tie the literature together.

Literature Topic One: OT Literature

This section reviews the White House, DoD, audit, and OT practitioner literature about OTs. Since the enactment of the original OT statute in 1989, there has been sustained audit organization and practitioner interest in the DoD OT program, for instance, to the ongoing interest in identifying reliable quantitative metrics to measure the program's success. DoD policymakers have issued internal policies to encourage DoD organizations to use OTs. Audit agencies such as the GAO and DoD IG have periodically reviewed the DoD OT program to assess its success and to gauge its accountability to taxpayers.

One purpose of discussing this field of literature is to build on the institutional history of OTs described in Chapter 1, particularly as that history is reflected in White House and DoD policies. Another purpose is to assess what audit organizations such as the GAO and DoD IG have concluded about the DoD program, including recommendations they have made that may have affected the wider use of OTs by DoD.

A third purpose is to analyze OT practitioner literature about the DoD OT program, again with an eye towards findings that may relate to the wider use of OTs by DoD. The OT literature review follows the purposes for a literature review discussed above and the literature review guidance of McNabb (2008), Bloomberg (2012), Creswell (2014), Jensen (2015), and Tummers (2011). Together, these purposes help the researcher find institutional factors that may have affected OTs in DoD and figure the relevance of the OT literature topic and to answering the research question.

The researcher identifies three subtopics of OT literature that are potentially relevant to the study. The first subtopic is White House and DoD literature policies that may apply to OTs. The second subtopic is audit literature concerning OTs. The third subtopic is OT practitioner literature. A synthesis of the OT literature topic follows the discussion of each of these subtopics.

White House and DoD literature

The first subtopic is White House and DoD literature. This literature provides policy context of how OTs fit into the larger national and DoD R&D policy landscape. The major idea developed in this literature is the need to harness private sector innovation for national policy objectives. This idea undergirds the OT statute and is reflected in national innovation policies. There are White House policies that highlight the importance of innovation in the national technology ecosystem. For example, in 2015, the White House issued its third national innovation policy (White House, 2015). The policy summarizes three key elements of the national strategy for innovation—catalyzing breakthroughs for national priorities, fueling the

engine of private-sector innovation, and empowering a nation of innovators. These elements are consistent with the DoD OT program's policy goal to attract nontraditional contractors to do business with DoD.

Another example of the idea of harnessing private innovation is exemplified by a White House committee that recently published the U.S. national science, technology, and engineering strategy (White House, 2016). The strategy calls for modernizing government to help in adopting innovative practices from the private sector. The strategy also recommends more use of prototyping to spur national innovation. Consistent with this strategy, the OT statute authorizes DoD to develop prototypes to meet DoD military needs.

Within DoD, several innovation policies reflect the idea of harnessing private sector innovation, specifically, for national defense needs. For example, in 2014, the DoD Research and Engineering Office published the biennial DoD Research and Engineering Strategy (DOD(R&E), 2014). The strategy emphasizes that delivery of advanced technologies remains a high priority for DoD. The strategy is consistent with the purposes for OTs, and so, with the study research question.

Another DoD policy reflecting this idea—this time from a DoD procurement perspective—is that USD(AT&L), the former senior DoD procurement official, published BBP 3.0 (DOD(AT&L), 2015). This policy recognizes that U.S. technological superiority is challenged like never before, and that the U.S. must be able to innovate, achieve technical excellence, and field dominant capabilities to meet these challenges. These problems require DoD to remove barriers to commercial technology, innovation and to realize a useful return on investment in technology products. Consistent with BBP 3.0, the DoD OT program is focused

on removing regulatory barriers to help DoD innovate and achieve a higher return on investment in advanced technology projects.

A white paper published by DPAP, the DoD procurement policy office (DOD(DPAP), 2015) further exemplifies the idea of harnessing private sector innovation for defense needs. The white paper discusses how OTs fit within the framework of BBP 3.0. The white paper also summarizes congressional statements about the need for DoD to more effectively leverage innovation from the commercial sector, finding that Congress believes that a key reason for this need is that procurement regulations or processes within DoD may make it difficult for many high-tech companies to collaborate with the DoD. Government acquisition and contracting regulations, cost accounting standards and audits, and intellectual property policies can deter private industry from working with DoD. Thus, the white paper summarizes the need to leverage commercial sector technology and points to burdensome DoD procurement regulations as barriers to change. It identifies OTs as a means for breaking down these barriers and increasing beneficial DoD collaboration with the high-tech companies.

The impetus to break down administrative barriers to tap into private sector investments is echoed in a recent Defense Business Board (DBB) report (DOD(DBB), 2015). The report focuses on science and technology investments in the period of declining market to support future warfare capabilities. The DBB finds that DoD could more effectively leverage its science and technology investments by exploiting private sector investments. The DBB notes how commercial Science and Technology (S&T) practices differ from DoD. For instance, unlike large commercial firms, there is no DoD-wide S&T strategy. The nationwide DoD laboratory organization is loosely coordinated. DoD has an aging workforce that is inwardly focused. Inflexible employee salaries make it difficult to reward and incentivize the workforce.

The DBB report finds that workforce demographics and compensation systems may drive innovative S&T processes in DoD, including OTs. Thus, the DBB report implies that an aging workforce and low employee salaries may be factors that explain why DoD does not more widely use OTs.

There are working level policies that are meant to help DoD harness private sector R&D for defense needs. For example, DoD has published an OT Guide (Guide) for DoD employees to help them negotiate and administer OTs (DOD(AT&L), 2002, 2017a). The Guide is not policy. Instead, it provides guidance that agreements officers must consider and apply as appropriate when they are using OTs. The Guide was first published in 2000. It was updated in 2002 and again in 2017. The Guide is a useful resource for OT practitioners and is often used as by contractors and DoD employees during initial OT negotiations.

In addition to illustrating the idea that the private sector is critical to meeting defense needs, the Guide has information relevant to the research question. For example, it emphasizes that individuals using OT authority should have an appropriate level of responsibility, business acumen, and judgment that enables them to work in this unstructured environment. The Guide also stresses that it is essential that OT agreements incorporate good business sense and proper safeguards to protect the government's interest. It explains that DoD has not developed a model OT or OT templates because they might undermine the purpose of the OT authority providing flexibility to negotiate OTs to meet the needs of the parties.

The OT Guide also discusses that nontraditional defense contractor participation is a metric that is used to track the success of OT projects. However, the government team is encouraged to establish and track any other metrics that measure the value of benefits directly attributed to the use of OT authority. Ideally, these should measure the expected benefit from a

cost, schedule, performance, and supportability perspectives. The Guide underscores the flexibility of OTs. For example, OTs may be entered into with any legally responsible entity. This can include a single contractor, joint venture, consortium, or a traditional prime contractor/subcontractor relationship. Thus, the OT Guide provides guidance on how DoD organizations can use OTs to harness private sector innovation.

But there are some DoD policy limitations on using OTs to tap into private sector innovation. For example, DoD recently published its only policy that squarely addresses OTs (DOD(AT&L), 2016). This two-page document responds to the 2016 congressional amendments to OT statute and requires Pentagon approval before awarding high dollar value OTs. Consistent with 2016 legislative amendments to the OT statute, the policy requires contracting officers to use FPDS to record OTs. But the study's conclusions in Chapter 7 discuss how this FPDS recording requirement is inconsistent with current FAR and DFARS regulations governing use of FPDS.

The DoD policy also requires that OT agreements officers must be contracting officers with the appropriate level of business and contracting skills because OTs do not use standard procurement clauses and boilerplate language. This policy is relevant to the research question because it reflects the lack of DoD policy on OTs and thus may help explain why OTs are not widely used by DoD. For instance, the lack of policy and training resources for OTs that, which gives DoD employees the freedom to negotiate OTs terms and conditions they decide appropriate, also helps explain why OTs are not more widely used. There may be little institutional policy knowledge for DoD employees to rely on to learn about OTs.

Congress has also shown interest in whether the OT statute is effective at leveraging private sector innovation. In 2016, for example, Congress directed DoD to report on whether the

statutory one-third cost-share requirement for traditional contractors should continue to apply to traditional non-profit organizations, for instance, large universities, or if the cost-sharing requirement should be removed altogether (Pub. L. No. 114-92, 2015). In 2017, DoD responded to Congress, reporting the value of the cost-share requirement; for instance, that it is both a financial and organizational commitment by the OT contractor to the project's success (DOD(AT&L), 2017b). The DoD report also notes that large non-profit organizations are less likely than traditional contractors to recoup this up-front investment after the OT is completed.

The DoD report finds that the cost-sharing requirement has been effective in influencing large contractors to partner with nontraditional contractors since these partnerships enable the large contractor to be exempt from the cost-share requirement. This enables the small entity partner to significantly participate in the DoD OT program. The report concludes by recommending that non-profit entities be exempted from the OT cost-sharing requirements, but that the cost-sharing requirement for other traditional contractors should remain because it encourages partnerships with small businesses and nontraditional contractors, which can bring new technologies and expertise to DoD.

In addition to illustrating how DoD has used OTs to leverage traditional and nontraditional contractors to develop new technologies, the DoD report is relevant to the research question because unlike traditional procurement agreements, for an OT subject to cost-share the contractor bears a significant portion of the project cost. The potential cost savings that cost sharing offers DoD may influence it to more widely use OTs. The role of cost sharing in OTs in deciding whether to use an OT is potentially relevant to answering the research question.

In summary the White House and DoD literature develop the idea of the need to harness private sector innovation for national policy objectives. The White House develops this idea

through policy issuances meant to spur national innovation. DoD policy and guidance develops the idea in the context of national defense, with a focus on maintaining the technological, and hence military, superiority of the United States over potential adversaries. DoD OT policy and guidance also reflects this focus.

Audit literature

The second subtopic is audit literature. The audit literature provides clues to what factors that audit organizations have identified that may be helpful in explaining why DoD does not use OTs more widely. One idea developed by this literature is whether OTs are an effective solution to deeply rooted problems of the traditional procurement system. To that end, there have been several GAO and DoD IG audits of the DoD OT program. There have also been reports and studies on OTs by nongovernmental organizations such as the RAND Corporation.

One factor in favor of using OTs may be that traditional procurement agreements impose a costly administrative burden on DoD. An influential early study supporting this conclusion was issued in 1994 by Coopers and Lybrand, a large accounting firm (Coopers and Lybrand, 1994). The report was requested by then-Secretary of Defense William Perry and tasked Coopers and Lybrand to conduct a quantitative assessment of the financial impact of the DoD procurement system on the overall cost of procured defense systems. The report's most significant finding is that the administrative requirements of DoD procurement system added about 18% to the overall cost of defense systems. The Coopers and Lybrand report recommends that DoD could achieve significant cost reductions by reforming particularly burdensome cost accounting regulations to give defense contractors relief from costly compliance requirements.

DoD could achieve reform without added legislative authority. Although this report does not specifically discuss OTs, it recommends reducing regulatory requirements to lessen the overall cost of procured weapons systems. This recommendation is aligned with the legislative intent for the OT statute and the purposes of the DoD OT program.

Another aspect of the idea of OTs as a solution to traditional procurement problems is reflected in the audit literature that reviews the effectiveness of OTs. The GAO has periodically review the DoD OT program to assess whether the program is meeting goals of the OT statute. For example, in 1996 the GAO reviewed the DoD OT program to decide whether it helped meet DoD objectives (GAO-96-11, 1996). The GAO reviewed 72 OTs that DoD awarded in the previous four fiscal years. It concludes that OTs appear to be a useful tool for DoD to leverage the private-sector technological expertise and financial investment. The GAO finds that OT contractors were contributing \$1.39 for every \$1.00 invested by DoD. In addition, the GAO concludes that OTs allow flexibility and customized terms and conditions that attract consortiums to do business with DoD. This report points to cost and administrative factors that may impact how widely DoD uses OTs and thus reflects the idea of OTs as a solution to the problems of the traditional procurement system.

The GAO has also assessed the DoD OT program by attempting to identify metrics to measure its success. For instance, a GAO review of the DoD OT program find that OTs represent only a small percentage of DoD's overall R&D spending (GAO/NSIAD-00-33, 2000). The GAO observes that DoD has had mixed results in attracting nontraditional contractors. It also finds that DoD has no reliable metrics for measuring the effectiveness of its OTs. The GAO concludes that new policy guidance is needed on how to tailor terms and conditions in OTs. DoD should also periodically report metrics to Congress on the numbers of nontraditional

contractors in the DoD OT program. The OT metrics literature shows that audit organizations are interested in assessing how effective OTs are in comparison to traditional procurement processes.

Further illustrating how the audit literature has gauged the effectiveness of OTs, GAO officials have testified before Congress about the needs for DoD to develop adequate OT training and policy guidance. In 2001, for instance, two senior GAO officials testified about these issues before House of Representatives Subcommittee on Technology and Procurement Policy (GAO-01-980T, 2001). This testimony responds to congressional and DoD concerns that government-unique procurement requirements—often implemented through specific contract provisions—inhibit DoD’s ability to take advantage of technological advances made by the private sector and increase the cost of goods, services. Though some of these provisions may be waived or tailored through existing contracting procedures, DoD officials and contractors find this to be challenging and time-consuming.

The GAO also testifies that OTs have had achieved mixed results in attracting commercial firms that traditionally do not do business with the government at either the prime or subcontractor level. They discuss that the government is no longer in the technology driver seat yet still needs access to research and technology advances. If DoD needs for access must be balanced against a range of commercial economic, legal, and other interests. OTs are among the tools the government can use to attract new players to the R&D arena and to keep access to advanced technologies. But effective use of these tools requires proper training and a greater exercise of discretion among program officials and contracting officers. Thus, the GAO testimony is consistent with the idea of OTs as a solution to traditional procurement problems.

Following this OT metrics literature, in a 2003 report, the GAO focuses on assessing whether DoD has developed quantifiable metrics for measuring the success of its OT program (GAO-03-150, 2002). The report notes that DoD had only defined one metric—the number of participating nontraditional defense contractors—which is measurable and directly related to each agreement and is tracked and reported internally. But the GAO finds that the DoD does not routinely report the metric to Congress in a useful format such as a summary table. Thus, DoD's key performance metric is not reported to Congress, making it difficult for Congress to assess the success of the DoD OT program.

The GAO's interest in OTs as a potential solution to traditional procurement problems has continued to the present. In 2016, for example, the GAO conducted a government-wide survey of federal agency use of OTs (GAO-16-209, 2016). The survey covers all OTs awarded by federal agencies during fiscal years 2010-2014. The GAO finds that most agencies use OT sparingly and that ten of eleven agencies reported that OTs are used in less than 5% of overall procurements. DoD indicated that OTs are used about 10% as much as traditional procurement contracts. But the GAO also finds that OTs enable federal agencies to enter into agreements with commercial partners that would not otherwise be possible under traditional procurement mechanisms. The relative numbers of OTs compared to traditional procurement agreements, and how OTs enable innovative agreements with commercial partners, reflect the idea of OTs as a solution to problems of the traditional procurement system.

The DoD IG has also published reports that reflect the idea of assessing OTs as a solution to traditional procurement problems. There have been two DoD IG reports on the DoD OT program. These reports follow the findings of the GAO reports. In 1998, the DoD IG performed an audit of DoD administration of OTs (DODIG-98-191, 1998). Like the GAO, the DoD IG

finds that there are no metrics for measuring the effectiveness of OTs. The DoD IG recommends establishing quantifiable performance metrics for OTs. In 2000, the DoD IG audited contractor costs charged OTs (DODIG-D-2000-065, 1999). The DoD IG finds no significant cost issues with DoD OTs. The DoD IG, however, recommends that DoD should give training to OT personnel on the treatment of cost share by contractors in OT agreements. OT metrics and training for OT personnel are potentially relevant to answering the study's research question. OT metrics are discussed in Chapter 7 as part of the study's conclusions and recommendations.

The Congressional Research Service (CRS) has also assessed OTs consistent with the idea of OTs as a solution to traditional procurement problems. In 2011, for instance, the CRS reported to Congress about the status of federal OT program (Halchin, 2011). The report discusses that OTs are meant to offer the government and contractors a blank page from which to begin negotiating OT agreements. OTs promote a more collaborative working relationship, which can be more conducive to R&D than traditional contracts. But the CRS notes that empirical evidence indicates that more traditional contractors than nontraditional contractors are participating in OTs.

For policy options, the CRS report recommends that the federal OT program be changed to: Require that all OTs include at least one nontraditional contractor; that agencies develop accounting standards and intellectual property rights regulations specifically for OTs; that agencies develop a hybrid procurement vehicle that would incorporate some safeguards found in traditional procurement agreements, yet would retain the desirable features of OTs; and that a government website be set up where agencies would disclose OT opportunities and provide information about established OTs (Halchin, 2011, pp. 39-40)). The CRS report concludes that while some embrace OTs as useful to the federal government, no one has yet devised a reliable

method for conducting an evaluation that would yield quantifiable objective data. The policy options outlined in the CRS report reflect the idea that OTs are a solution to traditional procurement problems, albeit a solution that needs additional policy changes to succeed.

Finally, there have been several RAND Corporation reports on the DoD OT program that assess OTs as a solution to traditional procurement problems. RAND has explored how effective OTs are compared to traditional procurement processes. A RAND report in 2002, for example, assesses the effectiveness of the DoD OT program in fiscal years 1994-1998 (Smith, 2002). The report finds that the pros of OTs outweigh their cons. The report finds that new ways of doing business and the flexibility inherent in OTs result in DoD being able to procure technologies that would otherwise not have been able under traditional procurement agreements. Although RAND is interested in conducting a quantitative assessment of the effectiveness of OTs, it concludes that such an evaluation was not possible because of confounding variables. The pros and cons of OTs outlined in the RAND report, and its discussion of methodological challenges at quantitatively assessing the effectiveness of the DoD OT program, helped inform the study's choice of a qualitative research design. The RAND report also reflects the idea of OTs as a solution to the problems of traditional procurement.

In summary, the audit literature develops the idea of whether OTs are a solution to deeply rooted problems of the traditional procurement system. The literature discusses some major problems of traditional procurement system. Related literature assesses the effectiveness of OTs, impliedly from the perspective of whether they can meet DoD procurement objectives not satisfied by the traditional procurement system. The ongoing, and as yet, unsuccessful search for reliable OT metrics is an interesting aspect of this literature.

OT practitioner literature

The third subtopic is OT practitioner literature. The OT practitioner literature provides insights about what OT practitioners—for instance, procurement attorneys and contracting officers—believe that OTs offer to federal agencies. Since the mid-1990s, there has been a steady stream of literature devoted to discussing negotiating and administering OTs. This literature is chiefly written by attorneys, contracting officials, and program officials working with OTs. One idea developed by this literature is that the historical context of federal procurement is important to understanding how OTs are viewed as a solution to the problems of traditional procurement. Another idea developed by this literature—one that is also reflected in the audit literature discussed previously—is the need for reliable OT metrics. And still another idea developed by this literature is that OTs have pros and cons, and practitioners must be knowledgeable about these pros and cons to properly use OTs. This literature also develops the idea of the importance of the contractor perspective on OTs.

From the historical context perspective, the enactment of the OT statute was part of the larger mosaic of policy efforts during the 1990s to reform federal procurement to help it leverage private sector capabilities. OTs are a progeny of this reform movement. Professor Schooner (1997) summarizes some acquisition reform challenges facing DoD in the 1990s which persist to the present. Relevant to the idea of OTs as a solution to traditional procurement problems, Schooner discusses the problems inherent in changing DoD from a culture of rule-based procurement towards an increased use of commercial practices. Schooner observes that change does not come quickly to any organization, and that this has been particularly true of the federal government and its procurement and contracting communities. Schooner suggests that DoD

move from rigid rules to guiding principles; that it should work to get bureaucracy out of the way; and that it give managers more authority and accountability.

Although Schooner does not directly discuss OTs, his research is historically relevant because it was published in the timeframe that OTs were being considered as a legislative solution to DoD needs for access to the most advanced technologies from private industry. It is also relevant because several problems discussed in the article—for instance, the need to move away from rigid rules to guiding principles—follow the pros and cons oriented literature discussed below. So, Schooner’s article is useful because it gives a sense of the political and normative environment that was in place during the mid to late 1990s and presaging the enactment of the OT statute.

Schooner published other work that provides a useful historical context for OTs. In 2002, Professor Schooner published his influential contract law desiderata (Schooner, 2002). Schooner argues that three main policy goals of the U.S. procurement system are transparency, procurement integrity, and competition. There is also an increasing policy emphasis on the procurement concept of best value. But Schooner notes that it is hard to describe the procurement regime without acknowledging the role of risk avoidance. Avoiding undue risk is a fundamental responsibility of any governing body. Obsession with risk avoidance, however, can suffocate creativity, stifle innovation, and make an institution ineffective. Schooner's observations about DoD culture and avoiding undue risk give historical context of OTs as a potential solution to address these types of institutional problems.

In 2009, Professor Schooner and Stephen Kelman, the former Director of the Office of Federal Procurement Policy (OFPP), published a news article that discussed the steps needed for acquisition reform to be effective (Kelman & Schooner, 2009). More procurement rules are not

needed. Instead, the federal government needs to invest in its people both in the long and in the short term. Schooner and Kelman's article was published in the midst of the great recession. It observes that budgets have declined in recent years but the acquisition workforce has been stable. Yet acquisition workload has increased more than 140% during the first decade of the new century. Kelman and Schooner also observe that acquisition work is increasingly complex and often performed in dangerous and unstable areas such as the Middle East. The article concludes that managing DoD's budget of almost \$500 billion (now, in fiscal year 2018, much higher) needs a serious investment in human capital. The emphasis on the need to invest in human capital versus creating more rules seemed historically relevant to OTs as a solution to a rules-based approach to procurement.

OTs have been directly discussed as a solution to the problems of traditional procurement. For example, Sumption (1999) discusses using OT authority to help DoD meet the challenges of creating successful acquisition strategies for acquiring advanced R&D technologies (Sumption, 1999). Sumption observes that OTs enable DoD agreements officers to negotiate terms and conditions to overcome barriers that have prevented firms from participating in federal procurement. Conversely, Sumption finds that cultural change is difficult and the lack of knowledge of the benefits of OTs leads to resistance to change. Sumption recommends that DoD leadership should be at the center of changing the institutional culture to increase use of OTs. She concludes that leadership at all levels of industry and DoD must support and focus on cultural changes needed to carry out OTs.

Concerning the idea that OT metrics are needed, OT practitioners have followed the GAO and other audit literature to try to find reliable quantitative metrics for assessing the effectiveness of the DoD OT program. Fike (2009), for instance, suggests several metrics that

could be used to evaluate the success of OTs (Fike, 2009). For example, Fike posits that relative cost savings could be used a metric, comparing OT and traditional procurement contract costs. The time saved in negotiating and administering OTs compared to traditional procurement contracts could be recorded and would serve as a metric to gauge the success of future OTs. According to Fike, another metric could be the time that each step of the procurement process takes compared to an OT; the presumption being that OTs have fewer and less time-consuming steps than traditional procurement agreements. Fike (2009) is one of few articles found that suggests metrics for OTs other than measuring the participation of nontraditional contractors.

There have been several articles pivoting around the idea of understanding the pros and cons of OTs. Kuyath (1995) is an early article developing this idea (Kuyath, 1995). Kuyath summarizes benefits of OTs, noting that these benefits are based on anecdotal evidence provided by program officials. Kuyath's OT pros and cons are used to help prepare the conceptual framework for the study, which is presented at the end of this chapter.

Bloch (2002) is another scholar that discusses the pros and cons of OTs (Bloch et al., 2002). According to Bloch, OTs were created to a further three goals; 1) enhancing military technological superiority; 2) streamlining the acquisition process; and 3) integrating civilian and military technology industries. Bloch notes that traditional contractors account for the large majority of OTs awarded by DoD. Thus, in contrast to DoD's goal to increase nontraditional contractor participation in OTs, Bloch argues that traditional contractors such as Boeing and Lockheed Martin get most OT awards. Bloch is useful because it shows that these challenges—which Bloch wrote about in 2002—appear to be just as relevant today in view of the study's findings. Bloch's OT pros and cons are used to help prepare the conceptual framework for the study, which is presented at the end of this chapter.

Like Bloch, Dunn (2009), discusses ideas related to pros and cons of OTs (Dunn, 2009). Dunn rebuts some of the most common criticisms of OTs, for instance, that OTs are more complicated than traditional procurement contracts because of the negotiation required to award them. Dunn also provides case studies of some notable OT successes. For instance, Dunn provides a brief case study of the Army's FCS OT, which is regarded as the most famous OT failure. Dunn, however, explains that the FCS OT was not a failure. Instead, the FCS program was a victim of politics, notably opposition to it by Senator McCain. Dunn concludes that OTs should be equal to traditional contracting, and he encourages greater use of OTs across the DoD. The FCS program is reviewed in more detail in Chapter 3 as part of the discussion of how the OT case studies were selected. Dunn's OT pros and cons are used to help develop the conceptual framework at the end of this chapter.

More recently, Cassidy (2013) discusses the pros and cons of OTs from an OT practitioner perspective (Cassidy, 2013). Cassidy explains that an advantage of OTs is they are not subject to the many regulations that traditional contracts have to follow. This makes an OT inherently more flexible than a traditional procurement contract. Cassidy finds that OTs offer DoD and the OT contractor significant leeway in negotiating terms that are favorable to both sides. OTs are also useful for attracting nontraditional contractors to do business with DoD. Cassidy emphasizes that the skill of the negotiating parties is critical in ensuring the success of the OT for both sides. Cassidy's pros and cons are used to help develop the conceptual framework for the study, which is presented at the end of this chapter.

In a recent study published by the Naval Postgraduate School, Stevens (2016) discusses the pros and cons of OTs (Stevens, 2016). Stevens summarizes the advantages and benefits of OTs, including flexible terms and conditions, their utility in attracting nontraditional contractor,

cost sharing, innovative business relationships, and the ability to construct procedures to manage risk and uncertainties. Stevens also reviews some disadvantages of OTs, including their lack of administrative safeguards, lack of metrics to measure their success, and that cost sharing can be a disincentive to traditional contractors agreeing to use OTs. Stevens identifies challenges facing wider use of OTs, including culture, training for OT officials, lack of OT expertise in the federal government and no advertising platform where contractors can find OT opportunities. Stevens also repeats what other practitioners have noted—that there are few, if any, metrics for measuring the success of OTs.

Stevens offers several policy recommendations to discuss perceived shortcomings of OTs. She recommends establishing government-wide OT working groups; creating a historian billet at each DoD component; building a dedicated website for advertising OTs opportunities to the public; and creating updated OT policies. Stevens' study is useful because it was published after major legislative revisions to DoD OT authority in 2016. The policy recommendations leverage the idea that OTs have pros and cons, and that some cons can be addressed by her enumerated policy recommendations. Stevens's OT pros and cons are used to help develop the conceptual framework which is presented at the end of this chapter.

Concerning the cons of OTs, Hanson (2005), a critic of OTs, provides one of the few quantitative assessments of the DoD OT program (Hanson, 2005). Hanson reviews DoD annual OT reports submitted to Congress between fiscal years 1997 and 2003 to figure the extent to which objectives of the OT legislation were achieved. Hanson finds that only 11% of OT awards between fiscal years 1997-2003 went directly to nontraditional contractors, with the remaining 89% going to traditional contractors. And only one-tenth of 1% of DoD R&D funding in those fiscal years went directly to nontraditional contractors. According to Hanson, only 1.91% of

R&D dollars over the five-year period studied went to nontraditional contractors. Thus, Hanson concludes that OTs are ineffective at attracting nontraditional contractors to do business with DoD. Very few contracting dollars have gone to nontraditional contractors.

Conversely, from the OT pros side, Dunn (2017) is a staunch supporter of OTs (Dunn, 2017). Dunn argues for the wider use of OTs by DoD. Dunn asserts that OTs should be the default R&D instrument in DoD. To support this assertion, Dunn points to FAR 35.002, which states that the primary purpose of contracted R&D programs is to advance scientific and technical knowledge and apply that knowledge to the extent necessary to achieve agency and national goals. Dunn finds that despite well-established legal authorities supporting the use of OTs, a traditional procurement agreement mindset overshadows such authorities and sometimes leads to awarding procurement contracts for purposes for which they are not entirely suited.

Dunn's insights about OTs within the larger context of DoD R&D procurement develop the idea that there are many pros to OTs and that any cons can be attributed to an institutional bias towards traditional procurement agreement. Based on his experience in working with the DoD OT program for the last several decades, Dunn concludes that DoD is unorganized and uneducated about using legal authorities to conduct R&D prototyping for fielding critical defense capabilities in quicker and less expensive ways. Dunn finds that R&D procurement authorities are unknown or poorly understood by most DoD organizations and that these organizations could benefit from their use. Underutilization of these authorities results in a failure to leverage their full potential. Dunn observes since 2000 there have been increasing legislative and administrative restrictions put on OTs, resulting in less use of OTs in the last decade.

Dunn also points to the lack of training as part of the problem. He concludes that it is possible for DoD to use OTs more widely, but employees who are willing to use OTs must be

unafraid to do so. Thus, nothing short of culture change within DoD is required for OTs to be used more widely. DoD must accommodate failure as part of innovative contracting methods. Dunn recommends that DoD employees must be provided with the legislative, regulatory tools, training, delegated authority and encouragement to use innovative contracting methods to meet DoD mission needs.

Other commentators have discussed OTs in the context of the idea of the importance of contractors' perspective on OTs. Dix (2003), for example, explores whether private industry contractors fears of doing business with the federal government are justified despite acquisition reform (Dix et al., 2003). She finds that some fears may be warranted and remain as pitfalls to doing business with the government. The R&D landscape has changed over the last decades, and the federal government understands that it is no longer the primary source of technological advancement in the United States. Intellectual property and other concerns are significant perceived barriers to doing business with the government. Dix cautions that doing business with the federal government requires a command of the federal procurement landscape to assess its risk and maximize opportunities.

Finally, in a recent briefing paper, Vadiiee (2018) illustrates the importance of considering OTs from the contractor perspective (Vadiiee & Garland, 2018). Vadiiee focuses on assisting contractors that are considering whether to pursue OT funding opportunities. This paper provides a historical summary of OTs and focuses on key terms and conditions of interest to contractors. It offers OT guidelines to contractors considering OTs and those that have been awarded an OT. For example, traditional and nontraditional contractors should considering teaming to enhance their ability to pursue OTs (Vadiiee & Garland, 2018, p. 12). Contractors should negotiate the minimum government purpose IP rights required by law, which will enable

the contract to retain maximum IP rights (Vadiee & Garland, 2018, p. 12). Contractors that are unfamiliar with federal procurement should consider joining a consortium OT. Vadiee cautions that although OTs are not subject to many procurement laws and regulations, some important criminal laws apply to OTs (Vadiee & Garland, 2018, p. 12). Thus, Vadiee further develops the idea that the contractor perspective on OTs is important.

In summary, the OT practitioner literature develops several ideas. First, the historical context of federal procurement is important to understanding why OTs are viewed as a solution to traditional procurement problems. The need for OT metrics is another idea developed by this literature. Much of this literature develop the idea of the need to understand the pros and cons of OTs. The pros and cons literature also outlines some policy recommendations for the DoD OT program. Finally, this literature also discusses the idea of the importance of the contractor perspective on OTs.

Synthesis of the OT literature topic

To synthesize literature topic one, the researcher attempts to situate the study's research question within the context of the prior OT literature. As discussed above, and following Bloomberg (2012), the researcher uses the literature review to find what has already been written about the DoD OT program to make sure that the study does not duplicate the results of prior studies. The literature is synthesized to figure gaps in the literature that the study could potentially fill.

One gap appears to be the lack of OT research that systematically uses accepted research methods to discuss institutional change factors that might explain DoD's relatively low use of

OTs compared to traditional procurement agreements. Most of the literature reviewed for topic one does not appear to systematically use an accepted research design, much less one that was institutionally focused. For example, the White House and DoD literature reviewed consists of policy materials directed at innovation ecosystem at a national or DoD level (White House, 2015, 2016; DOD(R&E), 2014; DOD(AT&L), 2015, 2016, 2017; DOD(DBB), 2015). Similarly, the audit literature focuses on identifying whether the DoD OT program has been successful at meeting OT statutory goals or reducing the administrative impact of the defense procurement system on the private sector (Coopers and Lybrand, 1994; GAO-96,11, 1996; GAO/NSIAD-00-33, 2000; GAO-03-150, 2002; GAO-16-209; DODIG-98-191, 1998). But neither the White House and DoD literature nor the audit literature, attempted to find institutional factors that may be impacting how widely DoD uses OTs. This study sought to fill that gap.

This gap is also evident in the OT practitioner literature. Most of the OT practitioner literature reviewed appeared to either be theory based (Schooner, 2002), metrics-oriented (Fike, 2009; Hanson, 2005) or practitioner-oriented (Dix, 2003; Kuyath, 1995; Bloch, 2002; Dunn, 2002, 2009, 2017; Cassidy, 2013; Vadiee & Garland, 2018). Some OT practitioner literature touches upon potential institutional change factors (Steven, 2016; Dunn, 2017). But none of the OT practitioner literature reviewed attempts to systematically identify and discuss institutional change factors and their impact on DoD's use of OTs compared to traditional procurement agreements. The study's research question seeks to fill this gap in the OT literature.

The researcher also uses the literature review to note areas of disagreement in the OT literature and to critique this literature. For example, there is no persuasive consensus in the OT literature about whether the pros of OTs outweigh their cons, or if the DoD OT program has been successful. Most of the literature reviewed for topic one attempts to examine the advantages and

disadvantages of OTs to support conclusions about their overall benefit to DoD and private industry (GAO-16-209, 2016; Halchin, 2011; Stevens, 2016; Vadiee & Garland, 2018). But only a handful of the articles reviewed try to use quantitative methods (Hanson, 2005) or qualitative methods (GAO-96-11; Dunn, 2009; Stevens, 2016) to support their conclusions.

Thus, a potential critique of this literature is that it generally has not attempted to systematically use accepted policy research methods to make findings about the overall merits of OTs or about the success of the DoD OT program. Most literature reviewed for topic one is not systematic because it largely relies on the authors' professional experience to support their conclusions (Sumption, 1999; Fike, 2009; Dix, 2003; Bloch, 2002; Dunn, 2017; Vadiee & Garland, 2018). While these articles are informative to the study, their lack of nexus to the larger universe of public policy research suggests that the study can contribute to the OT literature by studying DoD OT program using a recognized public policy theory—historical institutionalism—and by applying accepted policy research methods. Thus, another gap that the study attempts to fill for literature topic one is providing study findings and recommendation that are derived using historical institutionalism as a theoretical lens and by applying widely accepted qualitative research methods.

The literature review also helps the researcher define and scope the research question. As discussed above, few studies reviewed for literature topic one discuss institutional factors that may impact the DoD OT program. Sumption (1999), Schooner (1997), Stevens (2016), Dunn (2017), and Vadiee & Garland (2018) briefly touch upon cultural resistance to change in DoD as an institutional factor that might help explain the low use of OTs across DoD. But institutional factors are not the primary focal points of the OT literature reviewed for literature topic one.

Thus, literature topic one helped the researcher focus the research questions on what institutional factors that may help explain why DoD does not use OTs more widely.

The literature review is also used to provide a process for helping prepare the study's qualitative research design. Most of the audit and practitioner articles reviewed for literature topic one focuses on identifying and discussing advantages and disadvantages of OTs. Appendix L summarizes these advantages and disadvantages. While the articles reviewed for literature topic one do not discuss OT pros and cons in the context of institutional factors, the researcher found that the discussion of OT advantages and disadvantages informative for the study's research design. For instance, several articles discuss the administrative flexibility of OTs as a significant advantage that OTs offer over traditional procurement agreements (Kuyath, 1995; Dunn, 2009; Cassidy, 2013; Stevens, 2016; RAND, 2002; Halchin, 2011). In preparing the research design, the researcher assumed that the administrative flexibility could be an institutional factor that helps explains how widely DoD is using OTs.

The pros and cons of OTs discussed in literature topic one were useful in preparing several other parts of the study's research design. For example, the OT literature helped in preparing the interview questions presented in Chapter 1, the conceptual framework presented at the end of this chapter, and the study's predetermined coding scheme. The OT literature review also aided the interpretation and synthesis of the study's consolidated major findings.

In summary, an apparent gap in the OT literature is a lack of prior studies that systematically use an accepted qualitative research design and methods to identify and discuss institutional change factors to help explain DoD's use of OTs compared to traditional procurement agreements. The articles reviewed for literature topic one lack nexus to the broader field of public policy scholarship. The study seeks to fill this gap by providing a well-

documented research design that is informed by a systematic review of the prior literature.

Literature topic one is used to help prepare the research design for the study, including the interview questions, the conceptual framework, and the predetermined coding scheme.

Literature topic one aids the interpretation and synthesis the study's consolidated major findings.

Literature Topic Two: Historical Institutionalism Literature

This section reviews literature related to several concepts of historical institutionalism, including path dependence and endogenous institutional change. It also reviews literature that critiques historical institutionalism. Since historical institutionalism is used as a theoretical lens for the synthesis discussion in Chapter 6, this section gives an overview of historical institutionalism literature and how historical institutionalism concepts may apply to the study's research setting. This section has five subtopics: overview of historical institutionalism; historical institutionalism and the study's research setting; path dependence literature; endogenous institutional change literature; and critiques of historical institutionalism literature. Literature topic two concludes with a synthesis of the historical institutionalism literature.

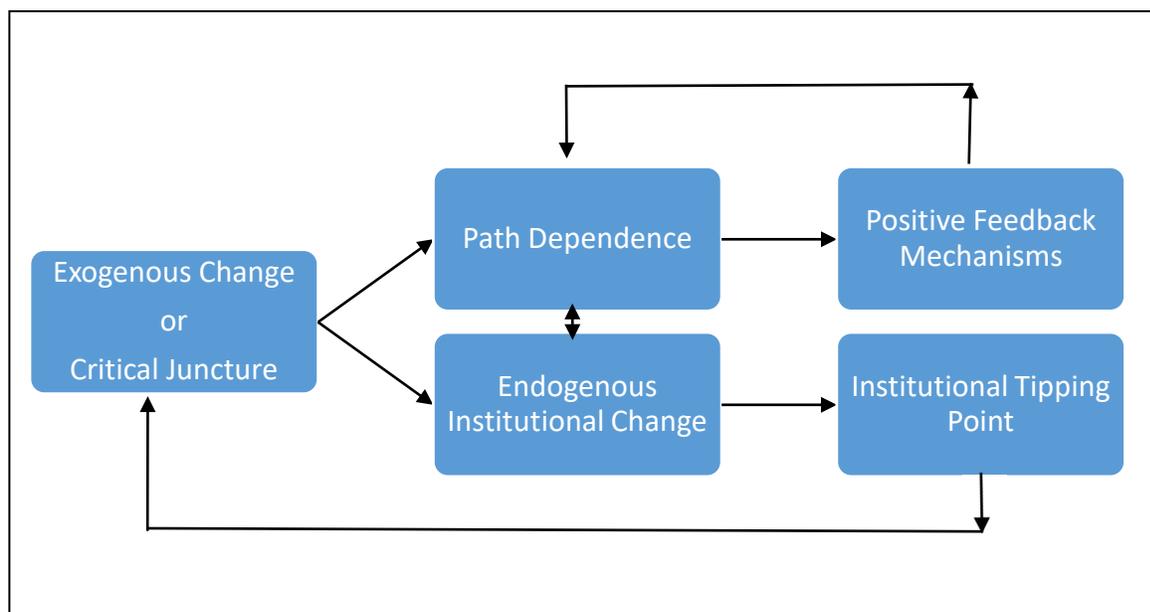
Overview of historical institutionalism

The first subtopic is an overview of historical institutionalism. Historical institutionalism has been used to analyze the institutional dynamics of U.S. federal policy systems (Broschek, 2013). Following Broschek, the researcher finds historical institutionalism to be a potentially useful field of literature for studying the DoD OT program because it is a federal policy system

that's institutional dynamics have been shaped by the history of the program and the OT statute. Historical institutionalism is a theoretical framework that traces its roots to the new institutionalism scholarship of the 1980s (Torfing, 2009). It assumes that the development of institutions is a temporal process and that many of these processes—institutional rules, policies, norms and so forth—are intrinsic parts of institutions (Pierson, 2000). An institution is a “system of human-made non-physical elements—norms, policies, organizations, and rules—exogenous to those each behavior it regulates, and that generates behavioral regularities” (Greif & Laitin, 2004, p. 635). Institutions can also mean norms embodied in formal rules that shape action and social political and economic process. A widely cited definition of an institution of this type is official rules, compliance procedures, and standard operating procedures (Sorensen, 2015, p. 20). As discussed in Chapter 1, the DoD OT program fits within these definitions of an institution.

Historical institutionalism scholars emphasize the political and temporal dynamics of institutions, defining them as enduring legacies of political struggles (Thelen, 1999). Historical institutionalism analyzes institutions using the temporally-oriented concepts of critical junctures, path dependence, positive feedback mechanisms, and endogenous institutional change and institutional tipping points. The following Figure illustrates the temporal relationships of the major concepts of historical institutionalism.

Figure 3. Temporal Relationships of Historical Institutionalism Concepts



Source: Author.

Institutions are formed, or significantly reformed, during critical junctures. A critical juncture is a short period where significant institutional change can occur because existing institutional processes do not offer adequate solutions to existing institutional challenges, or where existing political arrangements require an institutional solution (Sorensen, 2015). Thus, a critical juncture is a short period where there is a substantially high probability that agents' choices will impact the institutional outcome or agency, and a time where contingency is paramount (Capoccia & Kelemen, 2007). In DoD, for example, a critical juncture could have been the time when the current FAR and DFARS regulatory regime was instituted in the mid-1990s. This critical juncture led to the DoD procurement system that predominates today.

Path dependence is the most familiar concept of historical institutionalism. Path dependence more rigorously explains the intuitive idea that established institutions are difficult to change because early established institutional processes become “locked in,” and so small

choices early on can have enduring institutional impacts (Sorensen, 2015). Each step along an established institutional pathway makes the costs of institutional change higher. Thus, the passage of time sediments established institutional arrangements in place by making it administratively or politically harder to switch to alternative institutional paths (Pierson, 2000; Schreyögg & Sydow, 2009). This likely accounts for popular perception of the enduring nature of bureaucracy and its resistance to change. Within the DoD procurement system, for instance, path dependence that has locked in an institutional preference for traditional procurement agreements could be attributed to the creation of the current FAR and DFARS regulatory schemes in the mid-1990s. The DoD procurement system, and the procurement workforce that implements the system, are locked in the institutional processes that are sedimented in the system. OTs represent an alternative institutional path to the FAR and DFARS; a path that is seen as administratively or politically costly to take. Thus, the concept of path dependence may help explain the relatively sparse use of OTs by DoD organizations.

So, path dependence originates from institutional choices made during critical junctures. From a temporal sequencing perspective, path dependence results in present policy options being limited or molded by an institutional path that can be causally traced to past decisions (Torfing, 2009). Path dependence often results in the emergence of a dominant institutional scheme that is resistant to change (Schreyögg & Sydow, Prof, 2009). Thus, path dependence sometimes accounts for the linear inertia and resistance to change that characterizes large institutions such as DoD. The DoD procurement systems appears to show the characteristics of historical institutionalism. Habituated dependence on traditional procurement agreements persists despite the reported advantages of OTs for procuring advanced technology solutions for defense requirements (Dunn, 2009, 2017; Stevens, 2016; GAO, 2016).

There also appears to be positive feedback mechanisms at work in DoD. Positive feedback mechanisms are the institutional processes that act to reinforce path dependence. According to Pierson (2000), positive feedback mechanisms—or what Pierson calls “increasing returns processes”—are institutional processes that once established, discourage being changed or replaced because the costs of exiting to an alternative process are high (Pierson, 2000, p. 252).

The literature on positive feedback mechanisms identifies two basic types of mechanisms, functional and distributional (Thelen, 1999). Relevant to the DoD OT program, a functional positive feedback mechanism means that “once a set of institutions is in place, actors adapt their strategies in ways that reflect, but also reinforce the ‘logic’ of the system” (Thelen, 1999, p. 392). Thus, within DoD, a positive feedback mechanism may be established institutional processes such as automatic contract writing systems that influence DoD organizations and employees to continue to use these established processes instead of trying to draft an OT from scratch. But despite these apparent positive feedback mechanisms, the OT literature, and the researcher's own professional experience, suggests that some incremental change may be occurring within DoD, and this change will lead to wider use of OTs. This thinking led to the study's research hypothesis.

Thus, the DoD OT program may have several institutional processes that are reflected in the prior literature. First, the DoD OT program appears to have temporal processes where institutional rules, policies, and norms are intrinsic parts of the program (Kuyath, 1995; Dunn, 2009; GAO, 2016). Although the study does not assume path dependence, data collected during the study shows that path dependence associated with rules and regulations governing traditional procurement agreements might help explain why OTs are not more widely used by DoD (Pierson, 2000; Schreyögg & Sydow, 2009). Second, the OT literature and study data shows that

positive feedback mechanism might help explain why DoD organizations continue to use OTs relatively sparsely (Greif & Laitin, 2004; GAO-16-209, 2016). For instance, the OT literature implies that cultural factors such as administratively punishing failure and an institutional emphasis on auditing and inspections as positive feedback mechanisms perpetuate DoD employee choosing traditional procurement agreements instead of OTs (Dunn, 2009, 2017).

The literature contrasting historical institutionalism to other types of institutionalism also corroborates that it is an appropriate theoretical lens for the study. March and Olsen (2006), for example, discuss the origins of historical institutionalism in the new institutionalism movement of the 1980s (March & Olsen, 2006). They explain that new institutionalism recognized that institutions have political identities of their own. Although this was not a new idea at the time, namely, that institutions have identities much like individuals, it had fallen out of vogue in the decades preceding the 1980s. So, the term new institutionalism was coined on the pragmatic observation that bureaucracy occupies a dominant role in modern society and that most of the major actors in contemporary economic and political systems are formal organizations.

Historical institutionalism is a theoretic progeny of the new institutionalism scholarship. March and Olsen's discussion of the political identities of institutions is helpful in conceptualizing the DoD OT program as having its own identity which has evolved during the historical course of the program. The research hypothesis suggests that this identity is still somewhat unformed. It is useful to contrast historical institutionalism to other institutionalist theories. In an influential article that traces the theoretical development of historical institutionalism, Thelen (1999) discusses historical institutionalism by contrasting it with rational choice and sociological institutionalism (Thelen, 1999). Rational choice institutionalism focuses on observing how institutions function using assumptions about individual behavior. In contrast,

Thelen finds that historical institutionalism concentrates on the institutional history and that history is the primary generative force in the development of institutions.

According to Thelen, path dependency and critical junctures are essential attributes of historical institutionalism's approach to the development of institutions and institutional behavior. Thus, historical institutionalism focuses on studying institutional history and assumes that institutions are a legacy of discernible historical processes such as institutional norms, rules, and policies. Thelen concludes that the key to understanding institutions is defining positive feedback mechanisms of path dependence.

Thelen's findings are relevant to using historical institutionalism for the study because of her emphasis that history is a major force affecting institutional development. The DoD OT program's history is marked by repeated legislative efforts to expand use of OTs, coupled with DoD policy efforts to increase participation by nontraditional contractors. Both these initiatives have taken place in an institutional environment shaped by historically developed institutional norms, rules, and policies. So, again, the historical development of the DoD program appears to be important to understanding how it might develop in the future.

Building on the teachings of March and Olsen and Thelen, Ermakoff (2010) finds that there is a general trend among scholars to harmonize rational institutionalism and historical institutionalism (Ermakoff, 2010). This trend shows that institutions exhibit behavior and attributes that do not fit within either of these institutionalist schools of thoughts. Ermakoff finds that because of the increasing congruence between these two theoretical traditions, researchers need to give greater specificity to the evidence they gather support claims they elaborate using these theories. Relevant to the study, the researcher attempts to specify assumptions about DoD employee's behavior—for instance, about employee risk aversion and habit—and historical

institutionalist factors such as the exogenous impact that OT legislative action has had on the DoD OT program. Ermakoff helps the researcher harmonize rational and historical intuitionist elements of data collected during field research.

The historical institutionalism scholarship teaches the researcher interesting new ways to think about institutions. For example, Ma (2007) argues that theoretical origins of historical institutionalism are complexity science, and thus historical institutionalism is a significant shift from conventional institutional theories (Ma, 2007). Ma distinguishes historical institutionalism from more traditional institutionalist theories such as rational institutionalism. For instance, historical institutionalism broadens the concept of the institution to include formal and informal procedures and institutional norms. In contrast to rational institutionalist focus on equilibria, historical institutionalism focuses on historical processes and contingencies. Historical institutionalism abandons the assumptions of utility maximization for a cultural approach to institutions that emphasize moral and cognitive factors. These distinguishing features of historical institutionalism, for instance, its focus on historical processes and contingencies instead of institutions as equilibrium states, were persuasive to the researcher in selecting it as a theoretical lens for the study.

Capoccia (2007) discussion of critical junctures also influenced the researcher to select historical institutionalism as the theoretical lens for the study (Capoccia & Kelemen, 2007). Capoccia distinguishes critical junctures from the gradual accumulation of changes that can similarly result in an institutional tipping point followed by significant institutional change. But a tipping point is not a critical juncture, nor is it an element of a critical juncture. Capoccia emphasizes that researchers have to do more than identify a critical juncture. Researchers must also explicate what caused the critical juncture to occur and, what would have happened had the

critical juncture not occurred. According to Capoccia, process tracing and counterfactual analysis are essential to conducting useful research on critical junctures. Capoccia's discussion of tipping points informs the study's research design assumption that ongoing endogenous changes in the DoD OT program may lead to a policy tipping point that will result in wider DoD use of OTs. Since Capoccia used historical institutionalism in his research, it influenced the researcher's decision to select it as a theoretical lens for the study. Capoccia's discussion of process tracing also influenced the researcher to consider causal process tracing as part of the study's conclusion and recommendation for future research discussed in Chapter 7.

Historical institutionalism literature and the study's research setting

The second subtopic develops the idea that historical institutionalism literature applies to the study's research setting. The prior literature shows that historical institutionalism is relevant to the study's research setting. A useful idea developed by the prior literature is the relevance of the type of policy domain selected for the research setting. For example, Zehavi (2012) explores using historical institutionalism to study small policy domains (Zehavi, 2012). Zehavi notes that most studies using historical institutionalism focus on large national-level institutions. But his research of the small policy domains of the Massachusetts and Texas mental health care systems illustrates that traditional institutionalist concepts such as punctuated exogenous change and path dependence fail to adequately explain institutional dynamics in small policy domains. Zehavi finds that small domains are politically marginal, which weakens the policy strength of opposition and enables policymakers to pursue reforms more successfully than in large domains. In contrast to large institutional domains that have many veto points and actors who can form

coalitions to block policy change, small institutional domains have a less direct involvement by power elites, and so policy change is easier because of fewer veto points and opposing coalitions. Zehavi's insights about small policy domains appeared to apply to the research setting of the DoD OT program, which has characteristics of a small policy domain. For instance, the program appears to be politically marginal compared to DoD's much larger and well-established traditional DoD procurement program.

Broschek (2013) approaches policy domains from the opposite end of the domain spectrum than Zehavi by focusing on large policy domains. Broschek studies how historical institutionalism is well suited for studying U.S. national institutions (Broschek, 2013). Broschek notes that U.S. national policy systems have not been studied using historical institutionalism. But historical institutionalism's emphasis on timing, sequencing, and the importance of historical events makes it a good fit for analyzing the dynamics of federal systems. National-level systems can be analyzed using the concepts of path dependency and endogenous institutional change mechanisms. Broschek notes that these concepts complement each other in helping researchers to understand the dynamics of federal systems. Broschek concludes that historical institutionalism is useful for investigating policy dynamics of U.S. national institutions. Broschek was influential in persuading the researcher that the study provides an appropriate research setting for applying the historical institutionalism literature.

Professor Eckerd (2017) uses DoD weapons systems programs for his research setting, indicating that DoD programs are suitable policy domains. Professor Eckerd (2017) provides a quantitative analysis of selected acquisition reports for DoD major defense acquisition programs during fiscal years 1997-2010 (Eckerd & Snider, 2015). Based on his analysis of these programs, Eckerd finds that the role of the program manager—the program manager's training,

experience, and civilian or military—has no significant impact on whether the program is on time or on budget. This suggests that quantitative OT metrics should not be used to hold the DoD employees accountable for OT success, and that training and professional experience requirements may turn out to be related to OT success. Eckerd's study supports the idea that institutional analysis of the DoD OT program may be useful help explain why OTs are not more widely used by DoD. Thus, Eckerd influenced the researcher to choose a qualitative instead of quantitative research design for the study. Consistent with Eckerd, historical institutionalism offers a suitable institutionalist approach for studying the DoD OT program. Moreover, Eckerd's research setting—DoD major defense acquisition programs—is similar to the study's research setting, the DoD OT program.

In summary, the historical institutionalism literature usefully develops the idea of the relevance of the type of policy domain selected for the research setting. Zehavi, Broschek, and Eckerd, teach that a qualitative research design using historical institutionalism can be applied to a variety of policy domains relevant to the study, including small policy domains and to U.S. national policy systems. The DoD OT program is such a small policy domain and part of a national U.S. policy system, the federal procurement system.

Path dependence literature

The third subtopic is path dependence literature. The historical institutionalism literature lends credence to the idea that DoD is path dependent on traditional procurement agreements. There are several ideas developed by the path dependence literature that are helpful to the study. One idea, for example, is that institutions are inextricable from their historical context, and so

institutional analysis must account for institutional history. Pierson (2000) is a seminal article that develops this idea by arguing that institutions must be understood as processes that unfold over time, and that path dependence makes it hard for institutional actors to deviate from these processes. Thus, Pierson's central claim is that path dependence is a useful framework for developing the key claims of historical institutionalism, namely, that particular patterns and timing historical events matter, and that large institutional consequences can result from small institutional starting points. This claim evokes the creation of the FAR in the mid-1990s.

According to Pierson, institutions have several characteristics that make them prone to path dependence—for example, the central role of collective action and the density of institutions themselves. Large institutions often have concentrated hierarchical power structures that lead to power asymmetries. Weak institutional learning processes and the short time horizons of politicians intensifies path dependence in large institutions. These limitations make it difficult for institutional actors to deviate from established path-dependent processes. Pierson's article seems similar to the DoD procurement system, with its regulated procurement system and hierarchical power structure concentrated at the Pentagon. Thus, Pierson's observations about path dependence are relevant to answering the study's research question.

Schreyögg (2009) also develops the idea of the centrality of history in institutional analysis. Schreyögg concentrates on the role of path dependence as part of institutional development. He discusses that path dependence means that the historical sequence of events narrows permissible action, eventually resulting static institutional behavior. Path dependence has three phases: the preformation phase that coincides with critical junctures; the formation phase where institutional arrangements are initially set; and the dominant or path-dependent phase where the range of permissible solutions is narrowed. In social institutions, path

dependence may cause exploitative learning to drive out explorative learning. Institutional positive feedback mechanisms include emotional reactions, cognitive biases, and political processes. The DoD OT program appears to be situated in Schreyögg's dominant phase of path dependence. The OT literature suggests that explorative learning in the DoD OT program may be discouraged by positive feedback mechanisms such as employee cognitive biases favoring traditional procurement agreements and policy processes disfavoring risk taking, for instance, risks associated with trying new procurement processes like OTs (Stevens, 2016; Dunn, 2017).

Coombs (1998) takes a corporate-focused approach to the idea of the centrality of history in institutional development. Coombs (1998) argues that over time, corporations create knowledge management processes (KMPs) to institutionalize corporate processes that can lead to products or services innovation. Thus, path dependence on KMPs can lead to innovations that increase firm profits. Over time, firms institutionalize KMPs to help the firm generate innovation. Coombs discusses that path dependency is centered on positive returns, meaning positive returns as discussed in the economic literature about technological dependencies. KMPs create path dependency by doing things in a particular way that predisposes an organization to do this.

This insight is useful to the researcher because there may be nascent institutionalized processes—OT KMPs—within DoD that may lead to wider use of OTs. For example, mandating FPDS database to record all unclassified OT awards could lead to wider use of OTs by making DoD organizations aware of the numbers and types of OTs awarded by other DoD organizations. A DoD organization recently awarded a large non-competitive follow-on production contract to an OT contractor, perhaps indicating a future OT KMP—follow-on

production contract awards from prior competitively awarded OTs (Cassidy, Jennifer; Evans, & Tyler, 2018; Buetel, 2018).

Another relevant idea furthered by the path dependence literature is that the institutional development path is not static, but instead dynamically changes over time. Stack (2003) provides an excellent example of scholarship developing this idea. Stack (2003) introduces the concept of path creation as an alternative theory for helping explain organizational change (Stack & Myles, 2003). Stack explains that overemphasis on path dependence can cause scholars to fail to recognize path creation as an alternative explanation for policy paths. Stack proposes two ideas to differentiate path creation from path dependency. First, real-time influences and deviation caused by policy entrepreneurs can lead to path creation. Second path creation is a process of mindful deviation where policy entrepreneurs shape the institutional environment. Path creation studies should focus on the role of policy entrepreneurs to explain institutional dynamics. Stack's practical concept of path creation appears to apply to the DoD OT program, where policy entrepreneurs at DoD organizations such as DARPA and DIUx have been attempting to shape the DoD institutional environment to be more favorable to OTs.

Adding a different perspective to Stack's idea of path creation, Torfing (2009) discusses that path dependence, or what he refers to as institutional inertia, is reinforced over time by positive feedback mechanisms, resulting in sedimentation of rules, norms, and values. He underscores understanding the historical dynamics that produce and reproduce these entrenched policy paths within institutions is critical to explaining why it is so difficult to change policies once they are in place. Torfing proposes that institutional scholars should avoid treating policy paths as completely homogeneous and static. Instead, policy paths or path dependence must be addressed as dynamic and heterogeneous. These insights are relevant to the study. For instance,

entrenched DoD rules, norms, and values may have contributed to the relatively sparse use of OTs observed by the OT literature (GAO, 2016). To the extent it exists, the policy path of the DoD OT program is heterogeneous and shaped by exogenous dynamic forces such as legislative action and economic conditions (Halchin, 2011; Schooner and Kelman, 2009). Thus, Stack was relevant to answering the study's research question.

Path creation and positive feedback mechanisms, however, can also lead to institutional failure. Kuipers (2009), for example, builds on the idea of institutional paths by explaining how path dependence can cause institutional rigidity and lead to organizational decline and failure (Kuipers, B., 2009). Kuipers case studies of the organizational decline of the Tennessee Valley Authority and the Port Authority of New explains how path dependency may lead to organizational failure because path dependency inhibits the adaptive capacity of an organization. Three mechanisms of institutional reproduction are identified as relevant to causing decline. First, groups of institutional actors are stronger than others, enabling them to lock in positions of authority and influence. Second, efficiency mechanisms that at first give an organization a comparative advantage over other organizations can, over time, crowd out new ideas and ways of doing business. Third, legitimacy mechanisms can account for an organization becoming self-inflated with its importance, leading to institutional hubris and eventual decline.

It is intriguing to think of DoD in terms of institutional failure. But Kuipers' decline mechanisms may help explain why DoD has not more widely used OTs. For instance, institutional actors favoring traditional procurement agreements appear to be more prevalent than those favoring OTs and have locked in positions of authority and influence in the DoD procurement system. Similarly, traditional procurement mechanisms such as full and open

competition may have, over time, crowded out new ways of doing business such as OTs. Thus, Kuipers is relevant to answering the study's research question.

The path dependence literature has also developed the idea that institutional actors—employees, supervisors, leaders, and so forth—can create and shape institutional path dependence. Abeysinghe (2012) introduces the concept of discursive path dependence into historical institutionalism scholarship. Discursive path dependency is created by socially constructed relationships between institutional actors. In his informative case study of how the World Health Organization (WHO) responded to the 2009 avian influenza pandemic, Abeysinghe observes that the WHO's decision to use vaccines instead of more effective methods to combat the potential pandemic such as quarantines resulted from both institutional and discursive path dependency. These two theories of path dependency are interrelated, and studies that use one or the other on their own are oversimplified. Institutional dependency, historical institutionalism, emphasizes that current and future actions of an organization are influenced by historically contingent decisions in the past. Discursive path dependency, however, is created by socially constructed relationships between institutional actors.

Abeysinghe suggests that studies using historical institutionalism should consider both the discursive and traditional historical institutionalist versions of path dependence in analyzing institutional path dependence and feedback mechanisms. Abeysinghe was influential on the study because socially constructed relationships between institutional actors appear to be pervasive in the DoD's hierarchical institutional structure. For instance, relationships between DoD organizations and the Pentagon may discursively act to institutionalize a culture of risk aversion, which has contributed to the sparse use of OTs compared to traditional procurement agreements. Thus, Abeysinghe is relevant to answering the study's research question.

Sarigil (2015) adds to the idea of institutional path creation by focusing on how individual employees can impact institutional path dependence. In what he terms habitual path dependence, Sarigil argues that habit can be an alternative explanation for path dependence in historical institutionalism. Traditional views of path dependence ignore the role of personal habit in contributing to path dependence. Sarigil finds that there is a direct linkage between habits and institutions because institutional processes become embodied or internalized within individual institutional actors as habits. These institutionalized habits dispose institutional actors to think and act in certain ways without having to deliberate. So, institutional actors and institutions are linked by habit.

According to Sarigil, habitual path dependence is like other types of path dependence because it is inflexible non-ergodic, and can lock in institutional inefficiencies. However, endogenous change is still possible because individual actors sometimes reflect on their habituated institutional behavior and change their habits. For instance, an agreements officer without OT experience might reflect on the benefits of OTs and decide to try an OT instead of using a familiar traditional procurement agreement. So, studying institutional actors' habits is a useful way for inferring the formal and informal institutional patterns of institutional path dependence. This insight supports the study's reliance on qualitative interviews for investigating patterns of institutional behavior in the DoD program, for instance, the preference by some employees to use a traditional procurement agreement instead of an OT.

In summary, Pierson, Schreyögg, and Coombs develop the idea that institutions are inextricable from their historical context, and so institutional analysis must explicitly account for institutional history. Stack, Torfing, and Kuipers develop the idea that the institutional path is not static, but instead dynamically changes over time. Abeysinghe and Sarigil further the idea

that institutional actors can create and shape path dependence. As outlined by these scholars, these ideas appeared to be relevant to the study. Pierson's characterization of institutions as processes that unfold over time, Schreyögg and Torfing's focus on sedimented rules, norms, and individual behaviors, and Torfing's characterization of policy paths as dynamic and heterogeneous rather than static, suggest the relevance of path dependence as a conceptual tool to help answer the study's research question. In addition, Saragil's insight that personal habits link institutional actors and institutions provides a useful way to link the study's participant interview data to making broader inferences about institutional processes in the DoD OT program at large. So, the concept of path dependence, as developed by the ideas in the path dependence literature summarized above, is relevant to answering the study's research question.

Endogenous institutional change literature

The fourth subtopic is endogenous institutional change literature. The study's research hypothesis theorizes that institutional change is occurring at some DoD organizations and that this change will eventually result in the wider use of OTs across DoD. As summarized above, historical institutionalism is an appropriate theoretical lens for the study. The research hypothesis specifically posits that endogenous institutional change is occurring in the DoD OT program. Thus, Appendix M provides a summary of endogenous institutional change mechanisms discussed in the literature summarized below for this section of literature topic two.

The endogenous change literature can be organized around several key ideas. An initial idea is that the concept of gradual institutional change can be integrated into the traditional view of institutions as static, with change occurring infrequently but rapidly, for example, because of

the breakdown of policy monopolies (Birkland, 2011, p. 301). This idea assumes that a coherent theory of gradual institutional change must be integrated into theories of how institutions change. Thus, early in the theoretical development of historical institutionalism, policy scholars realized that the theory had to integrate a plausible theory to account for incremental institutional change because it is evident that institutions change gradually.

Policy scholars initially looked to the new institutionalism research to find explanations for gradual policy change. Clemens (1999), for example, summarizes several theories of institutional change that came out of the new institutionalism movement of the 1980s (Clemens & Cook, 1999). One theory is mutability. Institutional change involves social entropy. Mutable institutions change as they evolve. If there is a set of loose institutional rules rather than mandatory rules, there is more institutional mutability than in institutions with strong institutional rules. According to Clemens, another theory is internal contradictions. Institutional arrangements that have contradictory rules or that enable institutional actors to challenge the status quo will generate endogenous change. Institutional processes can also shape individual decision-making. Clemens concludes that these theories from new institutionalism suggest that the analysis of institutional change requires recognition of the heterogeneous nature of institutional arrangements and the potential this creates for endogenous institutional change. Mutability, internal contradictions, and the impact of institutional processes on individual decision-making are relevant to answering the study's research question.

Building on this early scholarship, later scholars have developed the idea of integrating endogenous institutional change into historical institutionalism. For example, Kickert (2011) argues that historical institutionalism is suitable for explaining incremental, gradual transformations within an organization (Kickert & Van der Meer, 2011). Kickert observes that

most organizational change is gradual but can accumulate and cause a significant change. Although historical institutionalism focuses on path dependency, Kickert emphasizes that historical institutionalism is congruent with the idea that organizations can gradually change. Kickert identifies five endogenous change mechanisms: layering, displacement, drift, conversion, and exhaustion. He concludes that historical institutionalism can provide useful theoretical insights for studying the small, slow, gradual change that is typical in most organizations.

Sorensen (2015) presents an overview of endogenous institutional change scholarship (Sorensen, 2015). Sorensen notes that recent historical institutional research has increasingly focused on identifying and explaining endogenous institutional change mechanisms that can account for gradual change. In contrast to traditional punctuated equilibrium theory, most institutional change is gradual and incremental. Incremental change transforms institutions over a relatively extended period compared to periods associated with critical junctures.

Thus, according to Sorensen, the standard state of an institution is either one of stability or constrained adaptive change. Sorensen views institutional rules as a potential source of endogenous change. Rules allow a broad range of interpretation; institutional change may occur even without the formal revision of rules simply through the way the rules are implemented or how compliance is enforced. Sorensen also sees institutional actors as a locus of endogenous change. He contrasts two standard institutional characteristics to decide whether change will occur—do defenders of the status quo have strong or weak change possibilities, and does the institutional system offer actors the opportunity for discretion, implementation, or enforcement. Sorensen's ideas about change opportunities may be useful characterizing DoD OT policies as strong (resistant to change) or weak (not resistant to change).

More recent scholars have continued to develop the idea that a coherent theory of gradual institutional change must be integrated into theories of how institutions change. For example, positive feedback mechanisms—normally thought of as amplifying path dependence—can also be a source of endogenous institutional change. Exploring this idea, Jacobs (2015) introduces the concept of self-undermining feedback as a source of endogenous institutional change (Jacobs & Weaver, 2015). Jacobs theorizes that positive feedback mechanisms to reinforce path dependence can cause policy change. Traditional historical institutionalism studies conceptualize positive feedback as a self-reinforcing policy process narrows the range of options available to institutional actors.

But Jacobs suggests that the range of policy alternatives available to these actors can be subject to expansion and contraction. One way this can happen is that over time new policy instruments are developed or technological change makes new tools available, and ideas from other institutions are introduced. If path dependent policies are seen as not working, institutional actors, become more likely to undertake the search for a new alternative to address these problems. According to Jacobs, negative policy consequences often provoke efforts to expand the range of workable options. The search for new policy approaches can build coalitions for policy change. Jacobs notes that is likely to occur in institutional settings where policy expertise is diffused rather than concentrated in a small group. Jacobs concludes that the concept of self-undermining feedback is a useful theoretical analog to positive feedback and that both are often at play and impact the development of institutional policies. Applied to the DoD OT program, self-undermining feedback appears relevant to efforts by some DoD organizations to spur wider use of OTs to address the problem of attracting nontraditional contractors.

Other scholars have developed the idea of a typology of gradual institutional change. A good example of this idea is Beland and Powell (2016), who summarize recent scholarship on different types of endogenous policy change (Beland & Powell, 2016). They discuss what they term as the dependent variable problem in the policy change literature. The dependent variable is a policy change, and it is hard to operationalize. The various theories of endogenous policy change try to operationalize this variable. Beland and Powell believe that incremental change studies are relevant in the United States due to the fragmentation of political power. Cumulative change typified many political institutions in the United States where a series of small incremental changes accumulate over time to lead to a significant change.

Beland and Powell also discuss that policy drift is prevalent in institutions where there are significant political or institutional barriers to change. Policy conversion is a mechanism of policy change found in institutional settings where there are mutable policies. Beland and Powell's discussion of policy drift and policy conversion are relevant to the study because the DoD OT program is part of a U.S. political institution—DOD—and because the extant OT policy is a sparse, non-binding, and so, mutable.

To address the dependent variable problem discussed by Beland and Powell, the following Figure illustrates how Kickert's layering, displacement, drift, conversion and exhaustion change mechanisms and Sorensen's delegated authority and change possibilities could be used to show endogenous change mechanisms in the DoD OT program. The Figure illustrates the idea that there is a typology of gradual institutional change, including DoD OT program examples of such change.

Figure 4. Four Potential Modes of Endogenous Policy Change in the DoD OT Program

Policy and Authority Characteristics of the DoD Organization:

		Low Delegated OT Authority	High Delegated OT Authority
OT Policy	Strong	LAYERING (Creation of new policy without eliminating old policy) Example in the DoD OT program: Determining what types of non-monetary contribution traditional contractors may use to satisfy the OT statute's one-third cost-share requirement	DRIFT (Transformation of stable policy due to changing circumstances) Example in the DoD OT program: Creation of local OT templates and clauses by DoD organizations
	Weak	DISPLACEMENT (Formal reform, replacement, or elimination of existing policy) Example in the DoD OT program: 2017 revision of the DoD OT Guide	CONVERSION (Internal adaptation of existing policy through changes in implementation) Example in the DoD OT program: Using OTs for loaning (bailing) DoD property to contractors

Sources: Figure adapted from Kickert (2011) and Sorensen (2015).

Other scholars have continued to build on the idea of a typology of endogenous institutional change comprising layering, displacement, drift, and conversion. Beland and Rocco (2016), for instance, focus on attempting to show how policy researchers can study policy drift (Beland, Rocco, & Waddan, 2016). They note that policy drift is found in institutions where there are political and institutional barriers to change, and that drift can occur where there is no legislative support for change. Policy drift can happen, for example, when national policymakers

fail to take action on policy issues as increasing the minimum wage or subsidizing access to childcare for working parents. Local policies can change to address these problems, despite no national level policy action. Beland and Rocco identify three analytical challenges related to policy drift. First, identifying drift is challenging because it is the absence of policy action, and thus is difficult to observe. Second is the concept of formal revision, the policy response to drift, in the policy change scholarship. Third, the analysis of policy drift requires identifying an appropriate period for assessing whether drift has occurred. The concept of policy drift as a source of policy change appears relevant because participants discussed the lack of DoD leadership support for OTs. There is little DoD policy guidance on OTs. Yet there are also indications that OTs are being more widely used at some DoD organizations. Thus, policy drift may be relevant to answering the study's research question.

Policy scholars have also borrowed ideas from other research fields and adapted them to craft theories of gradual institutional change. Greif (2004), for instance, takes a different approach to endogenous policy change than Kickert, Sorensen or Beland and Rocco. Greif uses game theory to propose a novel theory of endogenous institutional change and stability for historical institutionalism (Greif & Laitin, 2004). Greif introduces the concepts of quasi-parameters and self-reinforcement, and using game theory, provides a dynamic approach to institutions that can account for endogenous change and stability. Traditional game theory research can explain why institutions continue to exist by characterizing them as equilibria based on dynamic, iterative game-like action played by institutional actors. But game theory is challenged to explain how institutions change. To address this challenge, Greif proposes quasi-parameters. A quasi-parameter is an institutional parameter that is endogenously determined and therefore changes in the long term. An example of this in the DoD OT program is how DoD

organizations are delegated authority to use OTs. Endogenous change is driven by marginal shifts in the value of quasi-parameters. Thus, the policy for delegating authority to use OTs has been variable for different parts of DoD over time.

Greif also attempts to explain institutional stability. He theorizes that institutional actors will continue to follow customary practices based on limited knowledge, limited attention, and coordination costs. Institutionalized rules enable individuals to choose behavior for complicated situations. People are likely to rely on past rules of conduct to guide them and to continue following past patterns of self-enforcing behavior. But institutions can change due to endogenous processes, exogenous shocks, and combinations of both. Greif's ideas about knowledge, attention, and coordination costs are relevant to answering the study's research question. For example, participant interviews indicated that part of the reason that OTs are not more widely used in DoD may be because employees lack the knowledge, time and institutional support to try OTs.

Howlett and Cashore (2009) borrow ideas from traditional policy research (and thermodynamics) to suggest another approach to endogenous policy change (Howlett & Cashore, 2009). They argue that the traditional homeostatic model of policy change is inadequate to describe how endogenous change occurs in most institutional settings. They summarize that the homeostatic model of policy change has four elements: 1) analysis of policy development must be historical in nature; 2) Institutions and their embedded policy subsystems act as the primary mechanisms of policy reproduction; 3) paradigmatic change is a process where there is a fundamental realignment of policy processes, and absent such fundamental realignment, policy changes gradually; and 4) paradigmatic change is the result of events exogenous to the institutional. Howlett and Cashore also explain that in the homeostatic model of policy change,

there is homeostatic equilibrium, where positive and negative feedback mechanisms result in institutional equilibria following paradigmatic change. In the DoD OT program, the fiscal year 2018 legislative changes to the OT statute may end up becoming examples of paradigmatic changes of this type (Pub. L. No. 115-91, 2017).

But the homeostatic model is only one model of policy change. Howlett and Cashore propose two new types of policy change mechanisms, which they term neo-homeostatic and quasi-homeostatic change, to help explain institutional change. In the neo-homeostatic model of policy change, small-scale policy changes occur endogenously and gradually build up into paradigmatic change. In the quasi-homeostatic policy change model, internal policy goals are stable, but exogenously driven changes can cause paradigmatic policy shifts to occur. The quasi and neo-homeostatic model of policy change appear to be relevant to the study. The research question, for example, implies that neo-homeostatic change is occurring in the DoD OT program and that these changes will gradually build up to paradigmatic change, wider use of OTs by DoD. The quasi-homeostatic model of policy change may be reflected in congressional efforts to amend the OT statute to encourage DoD to more widely use OTs, for instance, by expanding the scope of authorized prototype projects in fiscal year 2016 (Pub. L. No. 114-92, 2015).

Adapting ideas from organizational learning and dialectical scholarship, Howlett (2009) proposes another explanation for endogenous institutional change, arguing that process sequencing is a better explanation for policy change than the historical institutionalist idea that policy change is created during critical junctures (Howlett, 2009). Howlett rejects the deterministic conception of policy change by many historical institutionalism scholars—specifically rejecting self-reinforcing path dependence as the only significant determinant of whether policy change occurs. Instead, institutional actors can use their formal power over

others to reinforce their advantages so that power asymmetries are a major source of increasing returns. Policy change can also involve exogenous lesson learning—namely bringing new ideas into existing policy systems. Factors such as these suggest that path dependence is only one source of policy change and that the path dependent model may only be relevant in limited circumstances.

With these observations in mind, Howlett suggests process sequencing is a more useful way to characterize policy change in many institutional settings. According to Howlett, process sequencing means routine non-major innovative changes at the margin of existing policies using existing policy processes, institutions, and regimes. Non-incremental change involves new policies, which represent a sharp break from how policies were developed and conceived but are still rooted in the same general concerns and problems. Process sequencing occurs throughout institutional path, with incremental routine change leading to significant endogenous change. Process sequencing is relevant to the study because the research question implies that process sequencing may be occurring in the DoD OT program and that this will lead to wider use of OTs by DoD. For instance, the recent update to the DoD OT Guide may be an example of process sequencing because it implements routine non-major innovative changes at the margins of current OT policy.

Finally, policy scholars have explored that idea that institutional actors can be sources of gradual institutional change. Koning (2016), for example, explains that an institution changes because of its interactions with the actors embedded within it (Koning, 2016). One change theory of this type is an ideational change. Ideational change emphasizes the importance of ideas in the processes of institutional change. Priming and framing of ideas are two ways that ideational change occurs. Endogenous change can also occur base on puzzling and learning

within an institution. The most important insight of what Koning terms ideational institutionalism is that institutional starting conditions are not enough to explain institutional change. People and ideas can change an institution. Thus, ideational institutionalism refers to the purposeful behavior of individuals for example priming and framing, or exogenous factors such as a crisis to explain change endogenous institutional change. Koning's summary of ideational institutionalism is valuable to the study because it stresses the relevance of individual institutional actors and their ideas as sources of policy change. This suggested there may be a link between interview data—ideas and opinions—collected from the study participants and endogenous change within the DoD OT program. For example, several participants discussed new ideas they had for spurring the wider use of OTs at their organization.

Like Koning, Schmidt (2008) focuses on the role of ideas and discourse in creating endogenous institutional change (Schmidt, 2008). He proposes discursive institutionalism as a theory of endogenous institutional change to complement established theories such as historical institutionalism. According to Schmidt, discursive institutionalism helps explain how institutions change by focusing on institutional actors as sources of policy change. Thus, discursive institutionalism helps explain how institutions change and avoids the conceptual limitations associated with path dependence in historical institutionalism. Discursive institutionalism has two components. First, the process by which institutional actors—for instance, individual employees—reinforce and support existing institution processes and norms is known as background ideational abilities. Background ideational abilities include the employee's understanding and compliance with established institutional processes and norms. By making sense of these processes and norms, and following them, employees contributes to maintaining the institutional stability over time.

Nevertheless, Schmidt also finds that employees can change an institution. Change results from employee foreground discursive abilities. Thus, for the second component of discursive institutionalism, using their discursive skills, employees can work outside their institutions even as they are inside them to deliberate about institutional rules and to persuade change. By combining employee background ideational abilities with foreground discursive abilities, historical institutionalism can account for institutional change by explaining the dynamics of change in discursive terms. In doing so, discursive institutionalism helps address the problems that historical institutionalism has in defining the role of individual agency and the dynamics of endogenous institutional change. Schmidt's account of discursive institutionalism appears to apply to the study because the OT literature suggests that DoD employees are habituated to comply with procurement rules and norms, and that this may contribute to chilling nontraditional contractors from doing business with DoD (Sumption, 1999; Stevens, 2016; Dunn, 2017).

Panizza (2013) adds Post-Structuralism Discourse Theory (PSDT) to complement Schmidt's ideas about discursive institutionalism (Panizza & Miorelli, 2013). Panizza agrees with Schmidt that including discursive elements in institutional analysis can contribute understanding institutional change. According to Panizza, however, Schmidt's discursive institutionalism neglects the relationships between power politics and discourse necessary to integrate a workable agent-centric model of endogenous institutional change. Like discursive institutionalism, PSDT conceptualizes an institution as a discursively constructed system of relations between their constituent elements. But unlike discursive institutionalism, PSDT emphasizes that social systems are open to political interventions and dislocations that make it impossible to ground them on an ultimate foundation; hence the post-structuralism moniker.

As discussed, Schmidt argues that institutional change occurs because of the foreground and background discursive abilities of individuals. Panizza's PSDT adds that power relationships between institutional actors are an important additional element needed for analyzing the potential for policy change. Thus, while discursive institutionalism can be useful for explaining institutional change, it is incomplete because it does not account for power relationships between institutional actors. PSDT must be added to discursive institutionalism to make it a more complete and workable theory for explaining endogenous institutional change. Panizza's emphasis on power relationships between institutional actors is relevant to the study because DoD is a hierarchal institution, with power relationships defined between DoD organization and between individual employees within DoD organizations. Panizza's PSDT may be useful for addressing the call for DoD to get bureaucracy out of the way and to give managers more authority and accountability (Schooner, 1997, 2002).

In summary, Clemens and Kickert elaborate on the idea that a coherent theory of gradual change has to be integrated into historical institutionalism. Sorensen builds on this idea by discussing formal and informal institutional rules as potential sources of institutional change. Jacobs posits self-undermining feedback to further develop this idea. Other scholars have developed a typology of gradual institutional change comprising layering, displacement, drift, and conversion mechanisms. Beland and Powell, Beland and Rocco, and Kickert develop these mechanisms. Policy scholars have borrowed ideas from other research fields to help explain gradual institutional change. The research of Greif and Howlett fall into this category. Cashore and Howlett and Howlett discuss the idea that institutions are not always homeostatic, but that endogenous change can also be used to explain institutional stability. Finally, policy scholars

have explored the idea that institutional actors are potential sources of gradual institutional change. Koning, Schmidt, and Panizza have developed this idea in interesting directions.

Critiques of historical institutionalism literature

The fifth subtopic is critiques of historical institutionalism. The researcher evaluates scholarly critiques of historical institutionalism to figure their relevance to the study. This literature is also useful because it provokes the researcher to think outside his comfort zone, namely, his comfort using historical institutionalism as a theoretical pillar to support answering the research question. Thus, the researcher reflects on this literature to figure if its critiques exposed potential shortcomings in the study's research design.

One idea animating the critiques of historical institutionalism is that historical institutionalism is flawed because it only looks back on institutional history, not forward. Thus, while historical institutionalism can help explain how historical mechanisms may account for the current state of an institution, it is not good predicting what will happen to the institution in the future. An early such critique of this type is Immergut (1998), who identifies several problems with historical institutionalism (Immergut, 1998). Immergut finds historical institutionalism is inextricable from its historical context. She also sees falsifiability is a problem because most historical institutionalism studies focus on one or a few cases and thus are not generalizable to all institutions. The researcher is sensitive to the potential for these problems to influence the study. For instance, the study only conducts two case studies and no counterfactual analysis of alternate historical paths for the DoD OT program. Thus, the study's policy recommendations may not be generalizable to other federal agencies.

Another scholar developing the idea of historical inextricability is Drezner (2010). Drezner observes that historical institutionalism is flawed because it cannot be used to predict future institutional events (Drezner, 2010). Thus, while historical institutionalism is useful to look back on what happened, it is not a useful theory for predicting what will occur in the future. Historical institutionalism's excessive attention to one causal process—history—can blind researchers to the possibility that there are other causal processes at work, for example, political struggles between institutional actors. For the study, the researcher is careful not to assume that artifacts of historical institutionalism, for instance, path dependence, account for DoD's apparent resistance to using OTs more widely.

Taking another approach to this idea, Blyth (2016) argues that historical institutionalism is not theoretically coherent because it is too open at the front end and too closed at the back end (Blyth, 2016). By the front end, he means its causal explanatory mechanisms are limited to historical contingencies. Historical institutionalism too narrowly focuses on the history and its influence on institutional design. But historical institutionalism attempts to add a theory of institutional change on its back end—the end dealing with the present. Thus, some historical institutionalism researchers have moved away from focusing on the temporal sequencing prevalent in many historical institutionalism studies and towards new theories of endogenous change, they try to shoehorn into the institutional analysis. So, Blyth concludes that historical institutionalism theory is weakened by trying to expand it to become a generalized institutionalism theory that attempts to explain not only history but also endogenous change. Blyth is useful to the study because, like Drezner (2010), he teaches that overly focusing on history as the only source of institutional development may lead to accounting sources of policy change to historical reasons. Within DoD, there may be sources of change that are not

historically derived, for instance, sources from other federal agencies or from Congress. The study is interested in identifying any such sources.

Another idea underlying critiques of historical institutionalism is that it fails to adequately account for the role of individuals in institutional change. Thus, Hay (1998) argues that historical institutionalism lacks a coherent explanation of the role of individual agency and institutional change (Hay & Wincott, 1998). In other words, historical institutionalism suffers from a lack of a logical connection between institutions and individual behavior. Hay concludes that individual behavior—including how norms, rules, and policies impacts individual behavior—must be addressed within the framework historical institutionalism for it to be a fully integrated theory. Hay provides useful cautionary information for the study. The interview questions and coding scheme for the study attempt to investigate how individual behavior—for instance, the individual agreements officer's decision whether to select an OT or a traditional procurement agreement, potentially impact DoD's use of OTs.

Developing this critique further, Peters (2005) argues that historical institutionalism scholarship's focus on endogenous institutional change misses what often causes institutional change—political conflict (Peters, Pierre, & King, 2005). Like Panizza (2013), Peters emphasizes the role of political conflict in institutional analysis and the influence of political actors to institute change within an organizational framework. He critiques path dependency scholarship by arguing that path dependency may mask conflicts between political actors under the surface of the stable organizational structure. Peters suggests that focusing on the actions of political actors can help address this problem. This is a useful insight for the study because within DoD there may be conflicts between political actors, for instance, between the Pentagon and field organizations. These struggles may be potential sources of institutional change, for

example, recent actions by Pentagon officials to empower subordinate field organizations to more widely use OTs.

In summary, Immergut, Drezner, and Blyth develop the idea that historical institutionalism is flawed because it too focused on institutional history at the expense of lacking ability to predict future institutional behavior or events. Hay and Peters develop the idea that historical institutionalism insufficiently accounts for the roles of institutional actors in causing institutional change. The researcher carefully reflected on these critiques and how they might apply to the study's research design.

Synthesis of the historical institutionalism literature topic

Much like for synthesis of literature topic one, the researcher attempts to situate the study within the context of the prior literature for topic two, the historical institutionalism literature. Following Bloomberg (2012), the researcher seeks to find gaps in the historical institutionalism literature that the study could fill. One gap is that the study's research design is different from prior studies in the historical institutionalism literature. As discussed in Chapter 1, the study explores a sample of DoD officials' perceptions of factors that have affected DoD use of OTs. The researcher focuses on interviewing participants that had have not been interviewed by prior OT studies. Relevant to the prior institutionalism literature, the researcher attempted to interview participants that are involved in negotiating and administering OTs. The study focuses on collecting data from street-level bureaucrats—DoD agreements officers, procurement attorneys, and program managers.

In this manner, the study's research design assumes that interviewing participants immersed in the DoD OT program would help to gather the most reliable data for answering the research question. Unlike the study's focus on interviewing participants with street-level experience in the program being reviewed, most of the historical institutionalism literature is exclusively theory based. For example, early historical institutionalism literature focuses on situating it within the broader institutionalism scholarship (Hay, 1998; Immergut, 1998; Clemens, 1999; Thelen, 1999; Pierson, 2000).

Other historical institutionalism literature focuses on the problem of integrating a workable theory of endogenous institutional change into the larger body of historical institutionalism theory (Clemens, 1999; Beland and Powell, 2016; Blyth 2016). Recent historical institutionalism scholarship focuses on building its theoretical foundations, for example by adding more sophisticated explanations for endogenous institutional change (Greif, 2004; Ma, 2007, Schmidt, 2008; Howlett, 2009; Sarigil, 2014; Sorensen, 2015; Koning, 2016). But this literature, while instructional and intellectually provocative, does not appear to tap data collected directly from street-level employees who are working in the institutional setting being studied. The study attempts to fill this gap by using participant data collected from DoD participants that are actively working in the DoD OT program, in tandem with using the concepts of historical institutionalism to answer a practical research question.

Another gap is that some historical institutionalism literature relies on case studies; one or two studies of national-level policy systems (Peters, 2005; Kuipers, 2009; Kickert, 2011; Abeysinghe, 2012; Panizza, 2013; Beland & Rocco, 2016). While these studies are useful, again, this literature does not try to tap participant data collected from a rich institutional setting. Instead, much of this case study literature seems to rely on qualitative document review rather

than data gathered directly from institutional actors embedded in the institution being examined. The study attempts to fill this gap in the case study based historical institutional literature by drawing on participant data collected from participants embedded in the DoD OT program to answer a practical research question about the program. Participant data is supported by case studies identified with the help on the participants. Data (major findings) from the case studies are used to triangulate data (major findings) from the organization participant interview. The study's two-part research design discussed in Chapter 3—organization interviews triangulated by case studies—appears novel compared to the prior historical institutionalism literature.

The literature review for topic two helped the researcher define the research question. Broschek (2013) finds that historical institutionalism is useful for analyzing federal systems and dynamics. Zehavi (2012) adds that endogenous institutional change mechanisms function differently in small policy domains than larger ones. With these findings in mind, the study attempts to use the concepts of historical institutionalism to investigate the dynamics of a small policy domain in the U.S. federal institutional system, the DoD OT program. The dearth of published studies of subnational policy systems suggests that the study's focus on the DoD OT program could contribute to the prior literature.

The prior literature critiquing historical institutionalism was also helpful in determining how the study could potentially contribute to historical institutionalism scholarship. Early critiques such as Immergut (1998) and Hay (1998) highlight that falsifiability, inextricability from historical context, and lack of a role for individual agency are weaknesses in historical institutionalism theory. These critiques helped the researcher prepare the research questions and to scope the interview questions, for instance, scope the questions to elicit the participant's

personal experiences in negotiating and administering OTs. Thus, the historical institutionalism literature helped the researcher prepare the research question and scope the interview questions.

In summary, none of the scholarly literature reviewed for topic two attempts to study a subnational policy system using data collected from street-level bureaucrats immersed in the daily operation of the institution being studied. Most of the historical institutionalism literature is theory based. The remaining literature is case studies. There is scant prior historical institutionalism literature examining subnational policies system and none of U.S. federal policy systems. There does not appear to be any prior literature that has studied a DoD program using the concepts of historical institutionalism. The study's two-phase research design discussed in Chapter 3 appears to be novel compared to the prior literature. Therefore, the study may contribute to the historical institutionalism literature by using participant data collected from DoD officials as part of a qualitative research design that uses historical institutionalism to help answer a practical research question about endogenous institutional change in a subnational policy system, the DoD OT program.

Conceptual Framework

As discussed, Bloomberg (2012) recommends that the literature review should conclude with a conceptual framework that suggests new relationships and viewpoints based on the literature review. Bloomberg finds that the conceptual framework is a central component of a dissertation and its scope is far-reaching throughout the dissertation chapters. Bloomberg, however, cautions that the development of the conceptual framework requires careful, logical, and thoughtful explication.

Following Bloomberg, the researcher developed a conceptual framework to help organize, interpret, and synthesize the prior literature and qualitative documents reviewed, data collected from participants and the researcher's field notes. From a practical perspective, the conceptual framework helps organize and make sense of information gathered during the literature review and from data collected during field research. For instance, the conceptual framework is used as a tool to organize the study's coding scheme. The conceptual framework is used to organize the study's major findings. The conceptual framework is also used to help interpret the study's consolidated major findings.

The literature review for the study involves several hundred articles, books, media, and other qualitative documents. The study collected interview data from a diverse range of DoD participants. The case studies focus on OTs that are being used to carry out work in sophisticated R&D programs and that involve a variety of program officials, agreements officers, and procurement attorneys. A sizeable amount of data was gathered from all these sources.

Thus, during the study, the researcher was deluged with data. The researcher faced the challenge of organizing, analyzing, interpreting, and synthesizing this information to answer the research question and make reliable, credible, and dependable study conclusions and recommendations. The researcher had to make sure that the coding scheme for the interview data is correlated to the literature review and can usefully code the interview data. The conceptual framework is used a tool for organizing and synthesizing the prior literature, participant interview data, and the case study data. Therefore, the conceptual framework is a tool to organize all the data collected help the study answer the research question. The conceptual framework guides interpretation and synthesis of the study findings. With these goals in mind, the researcher developed and utilized the study's conceptual framework in the following manner.

The researcher develops several conceptual categories and descriptions based on the interview questions discussed in Chapter 1. The conceptual categories help make sure that interview data collected from participants could be categorized with the corresponding relevant literature to answer the research question. For example, Interview Question 1 asks what participants believed are institutional and other factors that influence the decision to use an OT instead of a traditional procurement agreement? There are three subsidiary questions under question one that ask participants what factors impact selecting an OT, what factors potentially impact OT negotiations to succeed, and what factors potentially impact OT negotiations to fail.

Thus, the conceptual framework category description “OT Award” below corresponds to Interview Question 1, and its category description covers the three subsidiary questions under the main interview question. The following Table provides the conceptual framework categories and descriptions corresponding to each of the five main interview questions.

Table 11. Conceptual Framework Category Descriptions

Conceptual Framework Category	Category Description
1. OT Award	OT selection factors such as the need for agreement flexibility, OT success factors such as enhanced communications between the parties, and OT negotiation failure factors such as mistrust between the parties
2. OT Advantages versus Traditional Procurement Agreements (TPAs)	OT advantages such as flexibility, OT advantages impacts on the DoD organization such as contractor cost-sharing reducing cost of the OT project to the DoD organization, and OT advantages impacts on DoD such as attracting nontraditional contractors
3. OT Disadvantages versus TPAs	OT disadvantages such as lack of OT templates, OT disadvantages impacts on DoD organizations such as lack of employees with OT experience, and OT

	disadvantages impacts on DoD such as lack of OT administrative safeguards
4. Numbers of OTs versus TPAs	DoD organization factors such as employees' habitual preference for TPAs, and DoD-wide factors such as lack of OT training opportunities
5. What can be Changed	DoD organization factors such as increasing awareness of OTs, DoD-wide factors, including factors such as leadership support for OTs, and including resistance to change factors such as changing DoD procurement culture to not punish employees if OTs fail

Source. Author.

The following Table illustrates the relationship between the conceptual framework categories and the study's five main interview questions.

Table 12. Conceptual Framework Categories Corresponding to the Interview Questions

Conceptual Framework Category	Interview Question 1	Interview Question 2	Interview Question 3	Interview Question 4	Interview Question 5
1. OT Award	X				
2. OT Advantages versus TPAs		X			
3. OT Disadvantage versus TPAs			X		
4. Numbers of OTs versus TPAs				X	
5. What can be Changed					X

Source: Author.

Table 12 above shows that the conceptual framework is a repository to capture and organize the diverse interview data collected from study participants. For example, Interview Question 1 is: What do participants believe are institutional and other factors that influence the decision to use an OT instead of a traditional procurement agreement? The relevant conceptual framework category to capture participant responses to this interview question is “OT Award” factors. As discussed in Chapter 3, this category includes OT selection subfactors, OT negotiation success subfactors, and OT negotiation failure subfactors. These subfactors were selected based on the researcher's professional experience in the DoD OT program and refined based on data collected during the first participant interviews.

Interview Question 2 is: What do participants believe are the advantages of OTs compared to traditional procurement agreements? The appropriate conceptual framework categories to capture participant responses to this interview question is ‘OT Advantages versus Traditional Procurement Agreements (TPAs)’. As discussed in Chapter 3, this category includes OT advantages subfactors, OT advantages impact on the DoD organization subfactors, and OT advantages impact on DoD subfactors.

Interview Question 3 is: What do participants believe are the disadvantages of abilities compared to traditional procurement agreements? Since this interview question is opposite of the second interview question, the appropriate conceptual framework category to capture participant responses to this interview question is ‘OT Disadvantages versus TPAs.’ As discussed in Chapter 3, this category includes OT disadvantages subfactors, OT disadvantages impact on the DoD organization subfactors, and OT disadvantages impact on DoD subfactors.

Interview Question 4 is: What do participants all believe explains DoD's numbers of OTs compared to traditional procurement agreements? The appropriate conceptual framework category to capture participant responses to this interview question is 'Numbers of OTs versus TPAs.' As discussed in Chapter 3, this category includes DoD organization subfactors and DoD-wide subfactors.

Interview Question 5 is: What do participants believe could be changed to impact DoD use of OTs? 'What can be Changed' is an appropriate conceptual framework category to capture participant responses to this question. As discussed in Chapter 3, this category includes DoD organizations subfactors and DoD organization subfactors.

Table 12 above shows that one conceptual framework category applies to each interview question. But answers to interview questions were captured within different conceptual framework categories if this helped organize participant data. For instance, if during responding to Interview Question 4 about the relative numbers of OTs and TPAs, a participant discussed an advantage of OTs over TPAs, this response is recorded in the OT Advantages Versus TPAs conceptual framework category. Similarly, if during responding to Interview Question 3 about the disadvantages of OTs, a participant suggested what changes DoD could make to address an OT disadvantage, this response is recorded in the 'What can be Changed' conceptual framework category. Thus, multiple conceptual framework categories are used to capture participant interview responses, as necessary to organize and make sense of the data. Chapter 3 discusses how the conceptual framework categories are used to help develop the predetermined coding scheme for study. Appendix N provides the coding scheme for the predetermined factors and subfactors.

Next, the researcher cross-referenced the conceptual categories with what the researcher learned from studying the prior literature. For instance, relevant to the conceptual framework category 4—Number of OTs versus TPAs—Sarigil (2015) posits that individual habit is a significant source of endogenous institutional change. Panizza (2015) and Howlett (2009) discuss how power relationships between the institutional actors are salient variables that can explain the rate of endogenous institutional change. The teachings of Sarigil, Panizza, Howlett and the other prior literature reviewed were used to refine the conceptual framework. The following Table provides citations to relevant literature from literature topics one and two, organized by conceptual framework category.

Table 13. Conceptual Framework Categories Corresponding to the Relevant Literature from the Literature Topics

Conceptual Framework Category	Relevant Literature from Literature Topic One (OTs)	Relevant Literature from Literature Topic Two (Historical Institutionalism)
1. OT Award	Kuyath (1995); GAO (2000); Dix (2003); RAND (2002); Dunn (2009, 2017); Stevens (2016)	Coombs (1998); Hay (1998); Clemens (1999); Greif (2004); Howlett (2009); Kickert (2011); Jacobs (2015); Sarigil ((2015); Sorensen (2015); Koning (2016)
2. OT Advantages versus Traditional Procurement Agreements (TPAs)	Coopers & Lybrand (1994); Kuyath (1995); GAO (1996, 2000, 2016); Sumption (1999); Bloch (2002); RAND (2002); Dix (2003); Cassidy (2013); Dunn (2009, 2017); Fike (2009); BBP 3.0 (2015); DBB (2015); Halchin (2011); Stevens (2016); OT Guide (2015); DoD(AT&L) (2017); ONR (2017)	Coombs (1998); Clemens (1999); Greif (2004); Schmidt (2008); Howlett (2009); Sorensen (2015); Jacobs (2015); Koning (2016)

3. OT Disadvantages versus TPAs	Kuyath (1995); GAO (1996, 2000, 2016); Sumption (1999); Bloch (2002); RAND (2002); GAO (2003); Cassidy (2013); Dunn (2009, 2017); Fike (2009); Halchin (2011); Stevens (2016); OT Guide (2017); ONR (2017)	Coombs (1998); Clemens (1999); Greif (2004); Schmidt (2008); Howlett (2009); Sorensen (2015); Jacobs (2015); Koning (2016)
4. Numbers of OTs versus TPAs	Kuyath (1995); Bloch (2002); GAO (2000, 2016); Fike (2009); Halchin (2011)	Clemens (1999); Thelen (1999); Pierson (2000); Stack (2003); Peters (2005); Abeyasinghe (2009); Howlett (2009); Schmidt (2008); Kuipers (2009); Schreyögg ((2009); Torfing (2009); Ermakoff (2010); Jacobs (2015); Panizza (2013); Beland & Powell (2016); Beland & Rocco (2016); Blyth (2016)
5. What can be Changed	GAO (1996, 2000); Schooner (1997, 2002); Sumption (1999); Schooner & Kelman (2009); Halchin (2011); Stevens (2016); Dunn (2017)	Clemens (1999); Stack (2003); Peters (2005); Capoccia (2007); Schmidt (2008); Howlett (2009); Panizza (2013); Jacobs (2015); Zehavi (2012); Beland & Powell (2016); Eckerd (2017)

Source: Literature review, Chapter 2.

The researcher uses the conceptual framework as a framework for organizing, analyzing, interpreting, and synthesizing all data collected during the study. Figure 5 in Chapter 3 illustrates the centrality of the conceptual framework in the study's two phase research design. The conceptual framework categories provides a repository for organizing the interview data and cross-referencing it to teachings found in the prior literature. The conceptual framework is also used to help develop the coding scheme discussed in Chapter 3. It is additionally used to organize the study findings in Chapter 4 and Chapter 5. The conceptual framework guided interpretation and synthesis of the major consolidated findings in Chapter 6.

The conceptual framework was not a static document but instead was updated throughout the study based on new information. For instance, the conceptual framework was updated following completion of the organization interviews discussed in Chapter 4 and the OT case studies discussed in Chapter 5. The conceptual framework was reviewed before interpreting and synthesizing the consolidated major findings presented in Chapter 6. The conceptual framework was reviewed a final time before preparing the study's conclusions and recommendations discussed in Chapter 7. Therefore, the conceptual framework provides the study with a dynamic tool for organizing, analyzing, interpreting, and synthesizing all data collected during the study to answer the research question, to interpret and synthesize the consolidated major findings, and finally, to make the study's conclusions and recommendations.

Chapter 3—Research Design and Methodology

Introduction

This chapter provides the research design and methodology for the study. The purpose of the study is to investigate institutional factors that may have affected how widely DoD organizations have used OTs. The researcher believes that a better understanding of this phenomenon might inform policy recommendations to encourage wider use of OTs by DoD. In seeking to understand this phenomenon, the study research question is: Why, despite their reported administrative advantages, are OTs only sparingly used by DoD compared to more administratively burdensome traditional procurement agreements?

Related to the research question, the research hypothesis is: Although Congress has amended the OT statute to encourage wider use OTs, DoD has continued to use OTs sparingly. Based on the researcher's professional experience, institutional resistance to using OTs can be traced to path dependence and positive feedback mechanisms such as low leadership support and employee risk aversion and habit. The numbers and variety of OTs at some DoD organizations, however, indicate that institutional change is occurring, and this may lead to a critical juncture or policy tipping point, resulting in wider use of OTs across DoD.

To answer the research question and investigate the research hypothesis, the study uses five main interview questions:

1. What do participants believe are institutional and other factors that influence the decision to use an OT instead of a traditional procurement agreement?
2. What do participants believe are the advantages of OTs compared to traditional procurement agreements?
3. What do participants believe are the disadvantages of OTs compared to traditional procurement agreements?
4. What do participants believe explains DoD's relatively low use of OTs compared to traditional procurement agreements?
5. What do participants believe are factors that could be changed to result in wider use of OTs?

To collect data for these interview questions, the researcher interviewed participants who have relevant work experience supporting DoD organizations that are involved in the DoD OT program. Chapter 4 discusses these organization interviews. The purpose of the organization interviews is to make major findings that would help the researcher infer an answer to the research question. To triangulate these major findings, the researcher conducts two case studies of OTs from among those OTs identified by interview participants. For reasons discussed below, both case studies involve ongoing OTs at DARPA. The first OT case study is for the DARPA RSGS program and includes a traditional contractor. The second OT case study is for the DARPA Living Foundries program and includes two nontraditional contractors. Chapter 5 discusses these OT case studies.

This chapter covers the research design and methodology under the following sections: research sample; research design overview; case study design; data collection methods; data analysis and findings; data interpretation and synthesis. Study reliability, dependability, and

credibility are discussed at the end of the chapter. The chapter concludes by summarizing the study's delimitations and limitations.

Research Sample

The study interviews a research sample comprising 20 participants at DoD organizations nationwide and an additional ten participants for the OT case studies. The researcher selected this number of participants because they represented a reasonable cross section of occupations typically involved in OT negotiations and administration, namely, agreements officers, program managers, attorneys, support contractors, DoD headquarters policy and management employees, and contractors at consortium OT firms. The organizations these employees work at reasonably cover the list of DoD organizations with OT awards pulled from FPDS and those that participants recommended as representative organizations in the DoD OT program. The case studies participants are involved in the OTs of the case studies. Thus, the researcher believes that the research sample provides a representative cross-section of the DoD OT workforce. The researcher tries to interview participants that have not been interviewed in prior OT studies. The purpose of this is to attempt to glean fresh insights that might help answer the research question.

A subsection in the data analysis discussion below outlines why a frequency of response method is used use for analyzing the coded interview data. It also discusses why the researcher determined that an overall sample size of 30 participants (20 for the organization interviews in Chapter 4, and ten for the OT case studies in Chapter 5) is reasonable. The sample size is limited for several practical reasons. For instance, the researcher was unable to find study participants at some organizations such as the Office of Naval Research (ONR) and the United States Army

Medical Research Acquisition Activity (USAMRAA). Other DoD organizations, such as the Army Contracting Command–Redstone Arsenal, appeared, for study purposes, be redundant of other Army Contracting Command organizations involved in the study. Moreover, the initial interviews indicated that the study would be able to collect enough useful data from fewer, longer interviews rather than more, shorter interviews. This, coupled with the intent to develop actionable policy recommendations that could potentially be of near-term help to the DoD OT program, influenced the researcher to settle on a sample size of 30 participants.

Purposeful criterion sampling was used to find the research sample. Purposeful sampling is a proper method for collecting data in a case study (Bloomberg, 2008; Creswell, 2014). The researcher focused on identifying participants who satisfied the criterion of having experience in negotiating or administering OTs and that have recently worked at DoD organizations involved in the DoD OT program. Based on the research design literature, the researcher uses criterion sampling to permit reliable generalization and application of data from participants (Creswell, 2014).

To locate appropriate participants for the research sample, and embracing the notion of generative doubt, the researcher used the following location process. First, OT data from FPDS was used to get a sense of the numbers and DoD organizations where OTs have been awarded in recent fiscal years. As discussed in Chapter 1, FPDS is a publicly available federal government database used by federal agencies and organizations are required to report data on contracts whose estimated value is \$3,000 or more (GSA, 2016). The study's conclusions discuss that the FAR and DFARS do not require OT awards to be recorded in FPDS, and it is inconclusive whether DoD organizations are following policy guidance in the DoD OT Guide to do so.

But the researcher noted that the 11 DoD organizations found in FPDS and listed below have recorded at least some of their recent OT awards in FPDS. Each OT recorded in FPDS provides the names of the parties, the dollar amount, the state where the OT will be performed, whether nontraditional contractors take part in the OT, and a variety of other descriptive data. Appendix O provides the FPDS data fields and a sample FPDS data entry. FPDS does not include data about classified contracts or classified OTs. The researcher is unaware of any publicly releasable DoD data on classified contracts or OTs.

Thus, even though it is apparently an incomplete database, FPDS was a useful tool for initially finding DoD organizations that have recently awarded OTs. In October 2016, the researcher searched FPDS for DoD OTs recorded between fiscal years 2011-2015. The delimiting period was selected because it is the most recent five-year period recorded in FPDS and is consistent with the largest search span available in FPDS. Using search results from FPDS, 11 DoD organizations were identified that recorded OT awards during fiscal years 2011-2015. These DoD organizations are:

1. DARPA, Arlington, Virginia
2. Defense Threat Reduction Agency (DTRA), Fort Belvoir, Virginia
3. AFRL, Wright-Patterson Air Force Base, Ohio
4. Army Tank-automotive and Armaments Command (TACOM) Lifecycle Management Command, Warren, Michigan
5. USAMRAA, Fort Detrick, Maryland
6. Army Contracting Command (ACC)–Aberdeen Proving Ground, Aberdeen, Maryland
7. ACC–Picatinny Arsenal, Picatinny, New Jersey

8. ACC–Redstone Arsenal, Huntsville, Alabama
9. ONR, Arlington, Virginia
10. Space and Naval Warfare System Command (SPAWAR), San Diego, California
11. United States Special Operations Command (USSOCOM), Tampa, Florida.

Additionally, the researcher knows there are industry groups that offer R&D technologies to DoD organizations under consortium OTs. As mentioned in Chapter 1, a consortium is a coalition of U.S. companies and universities with a common interest of advancing technology associated with a technology area of interest to DoD, for example, medicine or the electromagnetic spectrum (Melita, 2017). Consortia work under articles of collaboration and are linked to DoD by a single umbrella OT with a DoD organization such as the Army's Picatinny Arsenal. Individual OT projects are competed amongst the consortium members and awarded by the DoD organization. Based on input from professional colleagues and using publicly available information, the following is a list of several consortia that have DoD OTs:

1. DoD Ordnance Technology Consortium/National Armaments Consortium (DOTC), <http://www.nwec-dotc.org/>
2. National Advanced Mobility Consortium (NAMC), <https://www.defensemobility.org/>
3. Vertical Lift Consortium (VLC), <http://www.verticalliftconsortium.org/>
4. National Spectrum Consortium (NSC), <https://www.nationalspectrumconsortium.org/>
5. Medical Technology Enterprise Consortium, <https://mtec-sc.org/>
6. Medical Chemical, Biological, Radiological, Nuclear (CBRN) Consortium, <http://www.medcbrn.org/>

7. Consortium for Command, Control, and Communications in Cyberspace (C5),
<https://c5technologies.org/>
8. Consortium for Energy, Environment, and Demilitarization (CEED),
<https://www.ceedtechnologies.org/>
9. System of Systems Security Consortium (SOSSEC), <https://sossecconsortium.com/>

The researcher used these lists of DoD organizations and consortia as a starting point to locate participants for the DoD organization interviews and the OT case studies.

Second, the researcher contacted colleagues at several of the above organizations—for instance, at AFRL, SPAWAR, Picatinny Arsenal, and the DOTC. The researcher asked these colleagues to give contact information for legal, procurement, program, or other persons at the organization knowledgeable about OTs and that might be willing to take part in the study. This delimiting factor is based on the public procurement literature's observation that OTs need close participation by experienced employees in these disciplines (DOD(AT&L), 2002). Thus, the researcher's professional colleagues helped to find suitably experienced organization participants for the study.

Third, and following interviews of the first several organization participants, it became clear that FPDS does not accurately reflect the scope of OTs and organizations that are currently taking part in the DoD OT program. For instance, some organizations such as DTRA and the Joint Program Office for Chemical and Biological Defense (JPEO-CBD) do not award their own OTs. Instead, they rely on contracting agents, for example, Picatinny Arsenal—a recognized center of excellence in the DoD OT program—and the DOTC to award OTs on their behalf. Thus, there are few DTRA and no JPEO-CBD OTs recorded in FPDS. Other DOD

organizations such as the Defense Innovation Unit Experimental (DIUx) and the Tank Automotive Research, Development and Engineering Center (TARDEC) use existing consortium OTs to satisfy their OT needs. Neither organization had OT awards recorded in FPDS.

FPDS also fails to accurately count the numbers of OT projects awarded under a consortium OT. In FPDS, a consortium OT is recorded as a single data entry. But many—sometimes hundreds—of OTs may be awarded under a consortium OT. As discussed in Chapter 4, the DOTC OT is an example of this practice. The result was that FPDS did not accurately show the overall numbers of OTs or the DoD organizations where OTs are being used. Because FPDS turned out to be an incomplete database, the researcher found it to unreliable for determining how widely DoD has used OTs. Thus, the researcher did not further consider using FPDS to support quantitative analysis of DoD OT usage, for instance, using quantitative research methods such as multivariate regression analysis.

Fourth, the participants were a helpful source of identifying added study participants. This was because the DoD OT community is relatively small and everyone seems to know other people in the community. In addition, new DoD organizations such as DIUx and the Strategic Capabilities Office (SCO)—neither of which has any OT entries in FPDS—appear to be growing sources of OT awards. Study participants from these and other organizations were voluntarily suggested other potential study participants to the researcher. Thus, the researcher relied on the snowball interview technique to find more participants for the study, meaning that he relied on participants to identify additional participants that might be willing to take part in the study (Bullock, 2016).

But the researcher tried to interview participants at most of the DoD organizations identified in FPDS and listed above. The researcher also interviewed key employees from

several OT consortiums. Thus, by combining information from FPDS, and using leads provided by study participants, the researcher was able to collect a sample of participants from a representative cross-section of DoD organizations and consortiums that are involved in the DoD OT program. The following Table provides a demographic summary for the organization participants.

Table 14. Demographic Summary for the Participants' Organizations

Organization Interview Number	Organization Identifier*	Gender	Age Range	Position	Job Experience (Years)	OT Experience (Number of OTs)
1**	DARPA	F	50+	Attorney	6	25
2**	DARPA	F	31-40	Agreements Officer	8	0
3	AFRL	M	31-40	Attorney	4	0
4	DARPA	M	50+	Agreements Officer	39	15
5	DARPA	M	41-50	Agreements Officer	15	40
6	DIUx	F	31-40	Program Official	2	35
7	AFHQ	M	31-40	Attorney	7	10
8	OSD	F	50+	Program Official	28	3
9	SPAWAR	M	31-40	Attorney	10	0
10	PIC	F	31-40	Program Official	13	7
11	NSC	M	50+	Consortium Official	32	4
12	DTRA	F	41-50	Program Official	18	7
13	NAVYHQ	M	41-50	Program Official	15	4
14	DOTC	F	31-40	Consortium Official	16	Several dozen
15	TARDEC	M	50+	Program Official	36	125

16	MDA	M	50+	Agreements Officer	25+	20
17	SCO	F	50+	Program Official	3	3
18	PEO-CBD	M	50+	Contracting Officer Rep.	1	1
19	SOCOM	F	41-50	Agreements Officer	17	1
20	DPAP	M	31-40	Program Official	15	0

Source: Author. Table format adapted from Bloomberg (2012).

* Organization identifiers are spelled out in Chapter 4. Appendix P provides the DoD organization descriptions.

** Pilot interview.

A sample of ten additional participants are identified for the OT case studies. Data collected from these case study participants are used to triangulate the major findings from the organization participants in the Table above. The following Table provides a demographic summary of participants for the OT case studies.

Table 15. Demographic Summary for the OT Case Studies

Participant	Organization Identifier*	Gender	Age Range	Position	Job Experience (Years)	OT Experience (Number of OTs)
RSGS1	DARPA	M	41-50	Agreements Officer	28	8
RSGS2	DARPA	M	50+	Program Manager	30	2
RSGS3	DARPA	F	41-50	Support Contractor	15	2
RSGS4	DARPA	F	31-40	Support Contractor	11	5

RSGS5	SSL, LLC	F	31-40	OT Contractor	9	1
LF1	DARPA	M	31-40	Support Contractor	2.5	3
LF2	DARPA	M	41-50	Agreements Officer	15	15
LF3	DARPA	F	41-50	Program Manager	1.5	2
LF4	Amyris, Inc.	M	41-50	OT Contractor	15	1
LF5	Zymergen, Inc.	M	41-50	OT Contractor	5	1

Source: Author. Table format adapted from Bloomberg (2012).

* Chapter 5 provides program descriptions for the RSGS and Living Foundries (LF) programs and company descriptions for SSL, LLC, Amyris, Inc., and Zymergen, Inc.

Overview of Information Needed to Answer the Research Question

Bloomberg (2012) discusses that a qualitative study must describe the kinds of information needed to answer the research question. The four major areas of information needed for most studies are contextual, perceptual, demographic, and theoretical. Following this guidance, Chapter 1 discusses that the study collected: 1) contextual information; 2) demographic information; 3) perceptual information, and 4) theoretical information. Contextual information comprises information relevant to organizational structure, mission, and history of DoD organization for participants in the study. The source for most of the contextual information was publicly available online materials and, as necessary, interview information collected from participants. The researcher used contextual information to prepare summaries of the DoD organizations where the study participants worked. Appendix P provides the DoD organization summaries.

Second, Bloomberg discusses that demographic information is profile information that describes who the participants in the study are, where they come from, their history, education, and so forth. Using a survey form, the researcher collected basic demographic information from study participants to help understand their age, gender, job title, DoD experience and work experience with OTs. This information is collected to help interpret and synthesize the study's major findings. For instance, it was hoped that the survey data might find whether participants with more DoD experience were less inclined to try new procurement processes such as OTs than participants with less DoD experience. A demographic summary of the participants is provided in Tables above.

Third, Bloomberg explains that perceptual information largely relies on interviews to uncover participants' descriptions of their experiences. As discussed in more detail below, the study gathers perceptual information comprising interview data from the organization and the case study participants. Thus, interview data is collected from 30 study participants.

Fourth, Bloomberg discusses that theoretical information comes from the literature review. The review of the prior literature, which was ongoing throughout the study, contributes the other study chapters, including the research design that follows. The literature review also contributes to the discussion in Chapters 4 through 7. The study considers what specific contextual information, demographic information, perceptual information, and theoretical information is needed to answer the interview question and to support interpretation and synthesis of the major findings. Appendix Q summarizes information required to answer the research question.

Research Design Overview

McNabb (2008) explains that qualitative research does not follow a single theoretical concept or unitary methodological approach. Instead, the researcher has leeway to use a variety of theoretical and conceptual approaches and methods. Following McNabb, the research design is adapted to the study's problem statement, rationale, significance, research hypothesis and in view of the research question. In Chapter 1, the study's problem statement concludes that DoD's inability or unwillingness to more widely use OTs is an unsolved and understudied policy problem. Thus, the study attempts to learn why DoD has not more widely used OTs. The significance of the study is that it might offer fresh insights on this enduring DoD policy problem, including what exogenous or endogenous factors have prevented the wider use of OTs by DoD. The apparent disparity between the low numbers of DoD OTs and large numbers of traditional procurement agreements recorded in FPDS suggests that institutional factors might help explain the difference in numbers.

The researcher determined that historical institutionalism provides a useful theoretical lens for trying to discern such factors. The researcher hypothesizes that endogenous institutional change is occurring in the DoD OT program, and this may lead to a critical juncture or tipping point, resulting in wider use of OTs across DoD. The research question and the interview questions in Appendix E are based on this problem statement, research significance, and research hypothesis.

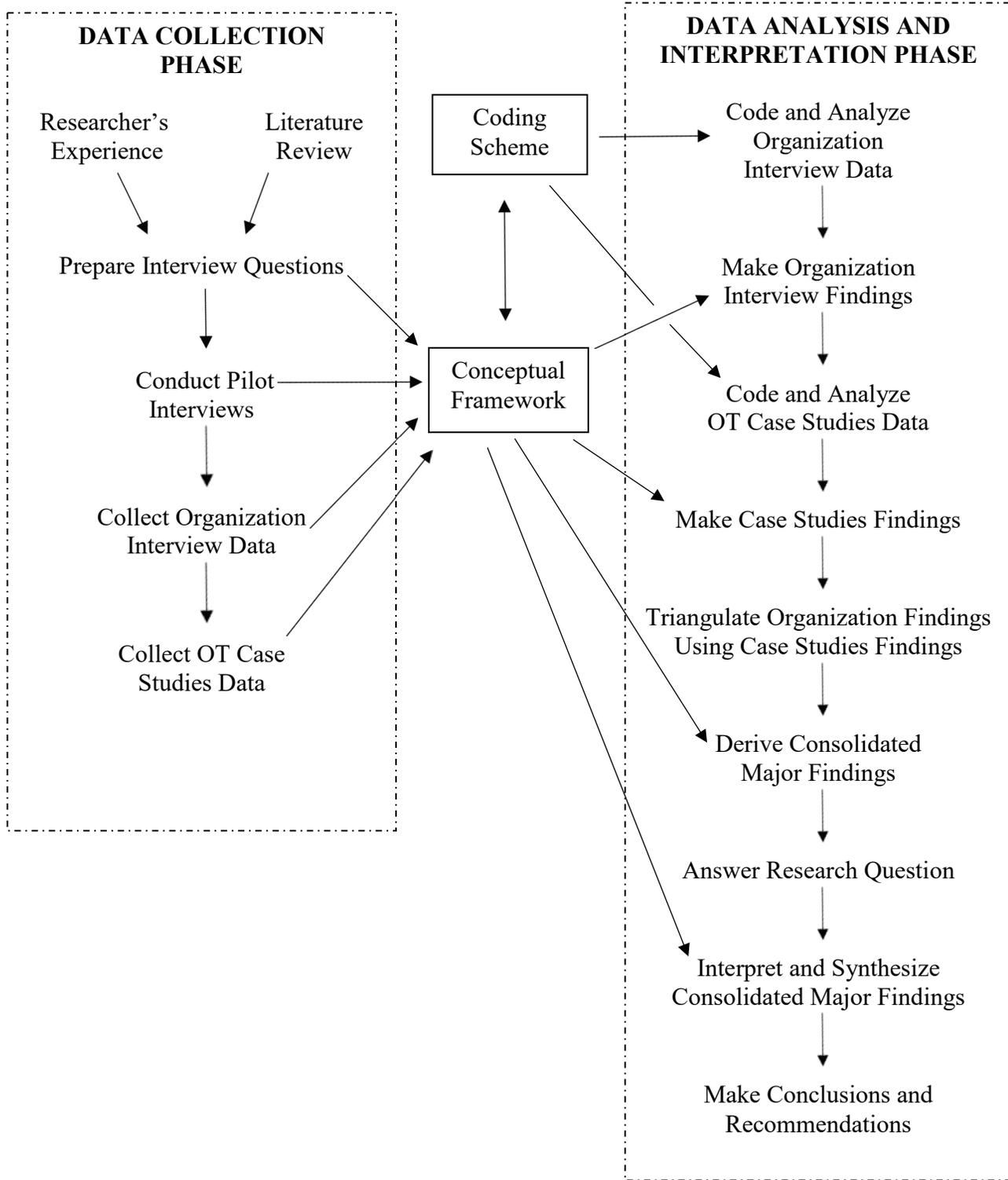
The study uses a two-phase research design consisting first of a data collection phase followed second by a data analysis and interpretation phase. This research design is flexible in the sense that it evolved as the study progressed and new information became available. This

particularly applies for the data analysis part of the study where the coding scheme evolved as the study progressed. The data collection phase use two qualitative research methods: First, qualitative interviews of participants—former and current officials supporting DoD organizations involved the DoD OT program—and, second, two OT case studies. The conceptual framework and coding scheme are used to organize the interview data.

The second phase of the study—data analysis, and interpretation—follows a similar sequence as the first phase. Data from the DoD organization interviews and the OT case study interviews were coded to derive major findings for answering the research question. Next, potential causal mechanisms that corresponds to the major findings were identified. The potential causal mechanisms for the organization interviews are then compared to the potential causal mechanisms for the OT case studies for triangulation purposes.

The major findings are used to prepare a set of consolidated major findings that combined all major findings. The consolidated major findings are used to prepare a narrative answer the research question. The consolidated major findings are interpreted and synthesized to support study conclusions and policy recommendations, including a recommendation for future research. The following Figure illustrates the flow of the study's two phase research design and its subsidiary steps.

Figure 5. Flow of the Study’s Two-Phase Research Design



Source: Author.

The following list provides a breakout of the steps illustrated in the Figure above.

Following the list is additional discussion of each listed step of the research design.

- Literature review: Preceding the study, a literature review was conducted to learn the contributions of prior researchers in the topics of OTs and historical institutionalism.
- IRB Approval: After successful prospectus defense, the researcher gained approval from the Virginia Tech IRB to proceed with the study. The IRB process involved developing a protocol to make sure that the study was conducted consistent with federal regulations governing the study of human subjects, including participants' informed consent and confidentiality.
- Pilot interviews: With prior approval from the researcher's faculty advisor, the researcher conducted two pilot interviews to help develop the research design and coding scheme.
- Informed consent and demographic survey: The researcher contacted potential study participants by telephone and email, requesting their participation in the study. Those who agreed to take part were emailed a consent form and demographic survey form. The survey form collected demographic information about the participant, for instance, their work experience with OTs and their job title.
- Organization interviews: Semi-structured interviews are conducted with 20 participants involved in the DoD OT program. These participants worked at DoD organizations and consortia that either have awarded OTs, are performing OTs, or are trying to establish an OT program for their organization.
- Identify OT case studies: With the help of the participants, the researcher identified the OT case studies. One OT involved a traditional contractor and the second involved two

nontraditional contractors. Type of contractor—traditional or nontraditional—was a control variable to help improve the reliability of the study. To increase the usefulness of the OT case studies to the overall research design, the researcher selected OTs that are ongoing at DARPA.

- OT case studies: The researcher conducted two OT cases studies. These included conducting semi-structured interviews with ten DARPA and contractor personnel involved in negotiating and administering the OTs that were the subject of the case studies.
- Data analysis: Organization interview data and case study interview data were analyzed using a conceptual framework and coding scheme developed based on the researcher's professional experience, the literature review and updated based on a review of an initial batch of organization interview transcripts. The researcher derive major findings for the organization interview and the case studies. The major findings are based only on interview data to improve the objectivity of the findings.
- Data triangulation: The interview data (major findings) from the participant organization interviews are compared to the interview data (major findings) from the case study interview data to triangulate the participant organization data. The researcher focused on trying to corroborate major findings from participant organization interviews with major findings from the OT case studies. The researcher derives consolidated major findings based on triangulation. The consolidated major findings are used to prepare a narrative answer to the research question
- Data interpretation and synthesis: The researcher interprets and synthesizes the consolidated major findings. Interpretation draws on all the coded interview data and the

prior literature topics. Synthesis draws on the concepts of historical institutionalism and the researcher's professional perspectives.

- Conclusions and recommendations: Interpretation and synthesis leads to the study's conclusions and policy recommendations, including a recommendation for future research.

Literature review

As discussed in Chapter 2, two literature topics are used to inform the study. The first topic is literature addressing OTs. The second topic is the historical institutionalism literature. The focus of the literature review is to answer the research question. The literature review also focuses on helping to find potential institutional factors that might help explain why OTs are not used more widely by DoD. The literature review informs development of the coding scheme and conceptual framework. The literature review aids the interpretation and synthesis of the consolidated major findings.

For the coding scheme, the researcher tries to make sure that predetermined codes are consistent with the teachings of the prior literature about path dependence and institutional change. For the conceptual framework, the literature helps scope the framework so it could be useful for organizing data collected from participant interviews and the OT case studies.

Virginia Tech IRB approval

Following an initial review of the prior literature and successful completion of the concentration lecture, the researcher successfully defended a prospectus for the study that included the background, rationale and significance, the research and interview questions outlined in Chapter 1, the literature review covered in Chapter 2, and the research design and methodology discussed in this chapter. Subsequently, the researcher gained approval from the Virginia Tech IRB to proceed with the study. Appendix G provides the IRB approval documentation.

Data Collection Methods

The study uses an exploratory research design. McNabb (2008) discusses that a primary goal of exploratory research is to build theories or develop explanations for what the researcher observes during fieldwork. The study uses several methods to collect qualitative data based on what was observed during fieldwork. Data is collected to gain an in-depth understanding of the DoD OT program and, following analysis and triangulation of the data, to answer the research question. Multiple data collection methods are used to add rigor, breadth, and depth to the study and to make study results more trustworthy. Thus, the study attempts to use several data collection methods, including pilot interviews, participant interviews, and case studies. These data collection methods are summarized below.

Pilot interviews

With the prior approval of the researcher's faculty advisor, Dr. Patrick Roberts, two pilot interviews were conducted to help refine the research design. The interviews were used to field test forms that would be used during fieldwork, including the participant consent form, participant demographic survey form, and the OT case study form. Appendices R, S, and T provide final versions of these forms.

The pilot interviews were conducted at DARPA in January 2017. The first interview involved a DARPA attorney and the second a DARPA contracting officer. The interviews were audio-recorded. The researcher took field notes during the interviews. After each interview, the researcher worked with the participant to complete the OT case study form. The pilot interviews were used to figure how to account for apparently missing DoD organizations in FPDS. The researcher understood that by relying on FPDS, the study might fail to locate DoD organizations that have significant OT experience. During the pilot interviews, one participant identified an Air Force official at the Pentagon who is knowledgeable about OTs and would take part in the study (DARPA1). The Pentagon office was not listed in FPDS. The researcher subsequently interviewed this Air Force official after IRB approval was obtained for the study.

The study's interview protocol was updated to ask participants if they could find other DoD employees knowledgeable about OTs and may be willing to take part in the study. During the data collection phase of the study show in Figure 5, this snowball interview technique turned out to be the most effective way to find participants during the study's data collection phase (Bullock, 2016).

Participant interviews

Participant interviews were the primary method for collecting data in the study. McNabb (2008) discusses that interviews are the most common method of collecting data in qualitative studies. The study collected and analyzed documents to help answer the research question, for instance, policy documents about the DoD OT program. But Yin (2009) points out that a shortcoming of documents is that people assume that they offer the unbiased truth about their content. Documents are subject to bias and may contravene the purposes of a study. Since the research question is directed at an unsolved policy problem that has persisted in DoD for decades, and in the face of many policy reform efforts, the researcher decided that interviews might be the best way to gather relevant data to shed light on the persistent question of why DoD has not used OTs more widely.

Semi-structured interviews are the most commonly used data collection method in qualitative research (Creswell, 2014). The study uses semi-structured interviews. Interview length ranged from 30 minutes to 1½ hours, depending on how much information the participants wanted to offer. As shown in Tables 14 and 15, the study was able to locate a homogenous group of DoD and contractor employees experienced in the DoD OT program. The researcher believes the research sample is reasonably representative of the DoD OT workforce and adequately covers the DoD organizations that are currently involved in the DoD OT program.

How the interview questions were developed

Bloomberg (2012) discusses that because interviews are a primary method of data collection, the researcher should explain how the interview questions were developed. The study's research questions are designed based on the interviewer's professional experience and the prior literature. The researcher tries to find broad topic areas that would need to be investigated to answer the research question. Thus, to understand the reasons for the disparity in numbers of OTs and traditional procurement agreements in DoD, the researcher prepared a set of topical questions reflected in the main interview questions. For example, Interview Question 4 is: What do participants believe explains DoD's numbers of OTs compared to traditional procurement agreements? Interview Question 4 was intended to gather information from participants involved in the OT program about what they think might explain the disparity in numbers between OTs and traditional procurement agreements. Thus, Interview Question 4 and its subsidiary interview questions were developed based on the researcher's professional experience in the DoD OT program.

Several other interview questions were formulated in the context of the OT literature. For example, Interview Question 1 is: What do participants believe are institutional and other factors that influence the decision to use an OT instead of a traditional procurement agreement? This question was based on the prior OT literature that discusses factors that may impact organizations to select an OT over a traditional procurement agreement. For instance, there is prior literature that outlines how OTs offer the government administrative flexibility compared to traditional procurement agreements (Dix, 2003; Dunn, 2009; Halchin, 2011; GAO, 2016). Additionally, there is OT literature that identifies the lack of administrative safeguards as a

weakness of OTs (Kuyath, 1995; GAO, 1996; Stevens, 2016). This prior literature informed development of Interview Question 1 and its related subsidiary interview questions.

Interview Questions 2 and 3 ask participants what they believe are the advantages and disadvantages of OTs compared to traditional procurement agreements. Much of the prior OT literature focuses on comparing OTs to traditional procurement agreements. For instance, there is literature that discusses the advantages of OTs (Bloch, 2002; Cassidy, 2013; Dunn, 2017). But there is other OT literature that discusses the disadvantages of OTs (Sumption, 1999; RAND, 2002; Fike, 2009). This literature provides the context for the researcher develop Interview Questions 2 and 3 and their related subsidiary interview questions.

The historical institutionalism literature also provides the context for developing the interview questions. For example, Interview Question 5 is: What do participants believe are factors that could be changed to impact DoD use of OTs? Thus, Interview Question 5 is about institutional change. The historical institutionalism literature on endogenous institutional change is useful for developing this interview question and related subsidiary questions. For instance, the literature on incremental institutional change mechanisms is informative for this interview question (Kickert & Van der Meer, 2011; Beland & Powell, 2016; Blyth, 2016). The institutional change literature on power relationships between institutional actors was also influential (Howlett, 2009; Panizza, 2016). The prior literature on integrating discursive institutionalism into historical institutionalist theory is helpful in developing the interview question (Schmidt, 2008; Howlett, 2009; Koning, 2016).

As discussed above, the pilot interviews were used to refine the interview questions. For instance, based on the participant interviews, Interview Question 1 was changed to include a subsidiary question directed at what participants believe my cause OT negotiations to fail. This

followed pilot interview participant remarks that OT sometimes fail because talks break down. The pilot interviews were used to reduce the number of interview questions and to develop interview questions directed at eliciting different information. For example, based on the pilot interviews, Interview Questions 2 and 3 were developed to help collect specific information about what participants believed were the advantages and disadvantages of OTs compared to traditional procurement agreements. Thus, the pilot interviews helped the researcher develop the interview questions used in the study. Appendix E provides the study's interview questions.

Interview protocol and field notes

Consistent with the semi-structured interviewing technique, the researcher used an interview protocol to structure how the interviews were carried out (Creswell, 2014). The interview protocol is provided in Appendix U. From a practical perspective, the protocol was used to make sure that each interview was conducted in the same manner as all other interviews. The researcher followed the protocol for each interview. For instance, the researcher provided each participant with a standard introduction to the interview that covered the purpose of the interview and the steps that the researcher would take to protect participant privacy. Participants were provided with an opportunity to ask the researcher questions before the interview started and after the interview was completed.

The researcher took field notes during the participant interviews. The field notes were transcribed following each interview while the information was fresh in the researcher's mind. The field notes were used to help corroborate the interview data in the transcribed audio recordings of the interviews. Field notes were used to help the researcher analyze and interpret

interview data. The researcher referred to field notes while preparing the study findings and recommendations. The field notes were helpful in clearing up ambiguities in the participant remarks. For instance, several of the participants used acronyms unfamiliar to the researcher. The field notes were a place for the researcher to jot down these acronyms so he could look them up after an interview and make sure he understood what the participant was talking about.

Storage of interview data and other data

Electronic data, audio recordings, and transcripts from participant interviews, is stored in two locations. First, some electronic data were temporarily stored on the researcher's workplace computer. This computer includes an encrypted drive and is protected by firewall processes. Electronic data were kept in an encrypted file folder in which only the researcher had access. Second, all electronic data are stored on the researcher's personal computer. This computer is also protected by a firewall and includes an encrypted drive. The researcher uses Bookends for Mac and MaxQDA software to store and organize electronic study data on the researcher's personal computer. Most hard copy data, for instance, prior literature, is scanned to electronic form and stored in the researcher's computers. Some hard copy data, for example, rough versions of field notes and working copies of prior literature, is kept in a locked cabinet at the researcher's workplace.

OT case studies

The study uses two OT case studies to triangulate the organization participant interview data. A separate case study protocol was not prepared. Thus, this section discusses the case study protocol within the broader framework of the study's overall research design.

Selection of the case study method over quantitative methods

A threshold issue for the study was developing a rationale for selecting the case study method to conduct research. The researcher considered whether a qualitative method such as a multisite case study would be more useful for answering the research question than a quantitative method, for instance, multivariate regression analysis. The literature on research designs for historical institutionalism studies supports using the case study method for the study. Hall (2003), for example, claims research ontologies have outlived methodologies in modern policy research (Hall, 2003). By this, Hall means that evolving ontological viewpoints of the world that have produced new policy theories such as historical institutionalism, and that these theories have outpaced the development of quantitative methods that case be used to test the theories.

Hall notes that several of the attributes of historical institutionalism such as path dependence are not suitable for study using traditional quantitative methods such as regression analysis. According to Hall, a contemporary dilemma facing policy research is that standard regression analysis is inadequate for studying social structures such as those found within historical institutionalist models of organizations. Path dependence and associated theoretical constructs such as positive feedback mechanisms do not operationalize the world as a set of

independent non-changing variables that impact dependent variables. Thus, Hall finds that theories of strategic interaction and path dependence do not conceptualize the world as the operation of timeless causal regularities, but rather as a branching tree whose tips represent the outcomes of events that unfold over time. Regression analysis is not suitable for studying this type of causation. Instead of using such quantitative methods, Hall recommends using small-n case studies to study social phenomena in historical institutionalist studies.

Hall is persuasive in convincing the researcher that the best way to answer the research question was to use qualitative interviews to find potential causal mechanisms. These mechanisms can be triangulated using a selected pair of OT case studies. Thus, the study could use a systematic process analysis to figure whether potential causal mechanisms (e.g., institutional factors) identified in the organization interviews were corroborated by potential causal mechanisms identified during the OT case studies. In this manner, these study's non-positivist ontological premises leverage a qualitative research design that recognizes the shortcomings of quantitative methods to investigate a complex social institution—the DoD OT program.

Boychuk (2016) builds on the work of Hall by discussing how comparative case studies are useful in historical institutionalism studies, including those that study path dependence (Boychuk, 2016). Boychuk explains that path dependence—a staple concept of historical institutionalism scholarship—assumes that a small event at the beginning of an institutional process can cause changes to occur later in the institutional path even though the original causal mechanism is no longer present. It is essential that the researcher find what the so-called path is in an institutional case study so that the study does not degenerate into what Boychuk calls a description of what happened rather than explanations for why it happened (Boychuk, 2016, p.

754). Boychuk stresses that researchers must try to find a set of causal mechanisms that can explain either path dependence or institutional change that diverts from the established institutional path. Boychuk persuaded the researcher to select the case study method over quantitative methods such as a survey. The case study method enables the researcher to investigate potential institutional change factors identified during participant interviews using case studies focused on a specific pair of OTs. This method is consistent with Boychuk and avoid pitfalls he identifies for applying quantitative research methods to study social phenomena using a historical institutionalist theoretical lens.

Bennett (2006) explains that small-n case studies are superior to quantitative methods for most social research (Bennett, 2006). According to Bennett, in qualitative research, the goal is the discovery and validation of causal mechanisms. Bennett teaches that small-n qualitative case study methodologies join a sophisticated qualitative worldview with a mechanistic approach to causation. Bennett explains that in qualitative methodologies, causation is not established by trying to discern traces of hypothesized causal mechanisms within the context of a historical case or set of cases. Using a few cases provides a better opportunity to gain detailed knowledge of the phenomena under investigation.

Thus, according to Bennett, by selecting a few cases to study in-depth, and by using qualitative methods to find potential causal mechanisms, researchers can use the case study method to explain institutional processes that otherwise would be difficult to study using quantitative methods. Bennett influenced the researcher decide to use a few case studies, and to discern findings—potential causal mechanisms—which were based on the major findings from the organization interviews and the OT case studies. The study's adoption of this mechanistic case study approach is discussed in more detail below.

Selection of a multiple case versus single case design

McNabb (2008) discusses two types of case studies used in qualitative research—single case and multiple case designs. Yin (2009) explains that the single case study design is useful for testing a well-established theory. It can be used for explaining a relevant or unique case. Single case studies can describe typical cases. Yin, however, recommends that multiple case designs should be used whenever practical. Multiple case studies have distinct advantages and disadvantages compared to single-case designs. One advantage is that the results from multiple case studies are often considered being more reliable than single case studies. But the choice of individual cases in multiple case studies is important and can be a disadvantage if the cases are not chosen carefully. Yin recommends that multiple case designs be approached as if each case was a separate experiment, and thus that the case study design be based on a replication approach. Although not the same type of replication found in quantitative work, Yin explains that theoretical replication in multiple case studies is analogous to quantitative replication in experimental work found in quantitative case designs. As discussed below, the study adopts Yin's experimental replication approach for the OT case studies.

The study uses a multiple case design. The multiple case design was chosen based on Yin's recommendation that multiple case designs offer more reliable results than single-case designs. Multiple case studies are found in the OT literature (Dunn, 2009) and are common in the historical institutionalism literature (Peters, 2005; Torfing, 2009; Abeysinghe, 2012; Jacobs, 2015; Beland-Rocco, 2016). Since the study relies on this prior literature to prepare the study's research design, it seems reasonable to use a multiple case study for the study.

Also following Yin, the OT case studies are conceptualized as quasi-experiments to help discern whether potential causal mechanisms derived from the DoD organization participant interview findings are replicated in the OT case study findings. In this manner, each OT case study is conducted akin to an experiment (quasi-experiment) to evaluate to what degree the case study major findings replicated the major findings of the organization interviews. The OT cases studies are conceptualized as experiments to determine if they replicated the major findings of the organization interviews. Therefore, the OT case studies triangulate the organization interview data, enhancing the ability of the study to reliably answer the research question.

Review of case study research designs used by the prior literature

The researcher reviewed the case studies in the prior literature topics from Chapter 2 to figure if their research designs offered any useful methodological insights that could be adapted for the study's research design. As mentioned, the study does not use a single-case research design. Thus, the researcher did not consider prior literature studies that use single-case designs—for instance, Abeysinghe (2012) and Kickert (2011). Although these prior literature studies were useful for understanding the theoretical development of path dependence in historical institutionalism, they did not offer helpful methodological tips for the study's research design.

There are several multiple case studies in the prior literature discussed in Chapter 2. From a practical perspective, the most useful such study is Dunn (2009). Dunn's case study of historically significant OTs focuses on rebutting criticisms of supposedly failed OTs such as the FCS OT. Dunn prompted the researcher to consider whether to use an OT failure as one of the

study's case studies. Dunn explains his research method in useful detail, including how he used interviews and a questionnaire. Overall, Dunn is the most helpful to the researcher in designing the two OT case studies presented Chapter 5.

The remaining prior literature multiple case studies prove to be informative for understanding the concepts of historical intuitionism, but not very helpful for designing the study's research design. For example, Kuipers (2009) uses case studies of the Tennessee Valley Authority and the Port Authority of New York to show how path dependence theory can be used to help explain the decline of these formerly successful institutions. But Kuipers does not offer any methodological insights into how or why these cases were selected beyond noting that the research design was inspired by a book and conference paper by Erwin Hargrove on how public organizations become institutions. This is not methodologically helpful to the study.

Similarly, Greif's (2004) study of endogenous institutional change using principles of game theory is useful in understanding how change may be theoretically explained in the DoD OT program. But the two case studies he uses concern governance processes in ancient Venice and Nigeria and Estonia. Greif does not systematically explain why he chose these cases, thereby reducing their methodological utility to the study.

Peters (2005) critiques historical institutionalism by arguing that it does not have an adequate theory of explaining institutional change. He claims that the importance of political conflict to initiating change in the institutionalist framework. Peters uses three cases studies to show the roles ideas, political conflict, and agency in explaining the relationship between path dependence and change in historical institutionalism. But like Greif, Peters does not explain how or why he chose the case studies.

Panizza (2013) uses two case studies to illustrate how PSDT can be useful a useful complement to discursive institutionalism for analyzing institutional change. The first case study examines the 2002 presidential election in Brazil; the second case study examines the making and implementation of poverty reduction policies in the 1990s Argentina. But, again, Panizza does not explain why he chose these particular case studies, for instance, whether they were representative of a larger population of similar cases where PSDT might be theoretically applied with discursive institutionalism. Thus, Panizza is not methodologically useful to the study.

Selection of a mechanistic/replication comparative case method

Fortunately, there is ample prior literature discussing the different multiple case study methods. The researcher surveyed this literature to figure which multiple case study method would be proper for the study. For example, Kaarbo (2011) provides guidance on the steps to follow in comparative case study research (Kaarbo & Beasley, 1999). A comparative case study compares two or more cases to make conclusions about a theory or hypotheses. The most important step is selecting proper cases. Kaarbo recommends that the selecting cases to compare should be driven by the goal of identifying variation across some dimension associated with an alternative explanation of the relationship being investigated for the study. Using Kaarbo's approach comparative method to choose cases, the study could have compared two OTs that had variation across a variable such as successful award negotiations or technical success.

Another potential multiple case study method was the comparative case method first proposed by the famous philosopher John Stuart Mill and recently discussed by Vannoni (2015). In the Millian method, the researcher first selects similar cases from a population for which the

research wants to infer causal relationships. Different cases with the same outcome are selected. For the DoD OT program, this could have been two OTs that were successfully awarded. In the Method of Agreement (MA) approach, the researcher removes variables that are different. In the Method of Difference (MD) approach, the researcher removes variables that are the same. In either approach, the remaining variables are assumed to be the causal mechanisms that explain the same outcome in both cases.

The researcher did not use the Millian comparative case method because there appears to be many unknown variables that could be relevant to answering the research question. The Millian approach seems to be most useful where the numbers of potential explanatory variables are low and can be well defined. This was not the situation for the study. Many potential variables might explain why DoD is not more widely using OTs. Some, indeed many, of them are still unknown. Thus, the Millian approach was not adopted for the study.

Instead, the researcher adopts the mechanistic comparative case method of Beach (2016) and Yin (2009) for the OT case studies. Beach (2016) proposes a mechanistic approach for a comparative case analysis where representative cases are selected from a homogenous population of cases to enable research inferences to be made that can be assumed to pertain to the population (Beach & Pedersen, 2016). Beach surveys prior literature definitions of causal mechanisms in institutional systems, noting that the variety of definitions arises from “different outcomes” (Beach and Pederson, 2016, pp. 5-6). From this survey, the study defines a causal mechanism as a theorized link between a cause and an outcome. A potential causal mechanism is a theorized link that has not been empirically tested, for instance, in a single or multiple case study where the cause and outcome are present.

In Beach's mechanistic approach, a set of mechanisms are identified that are common to two or more cases and can be used to infer an outcome common to all cases. With this mechanistic approach, it is vital to select cases as representative as possible of the rest of a homogenous population. This enables inferences from the case studies to apply to the population of homogenous cases. The goal of this method is to use mechanistic evidence to help shed light on causal processes that can infer answers that apply to a population of similar cases.

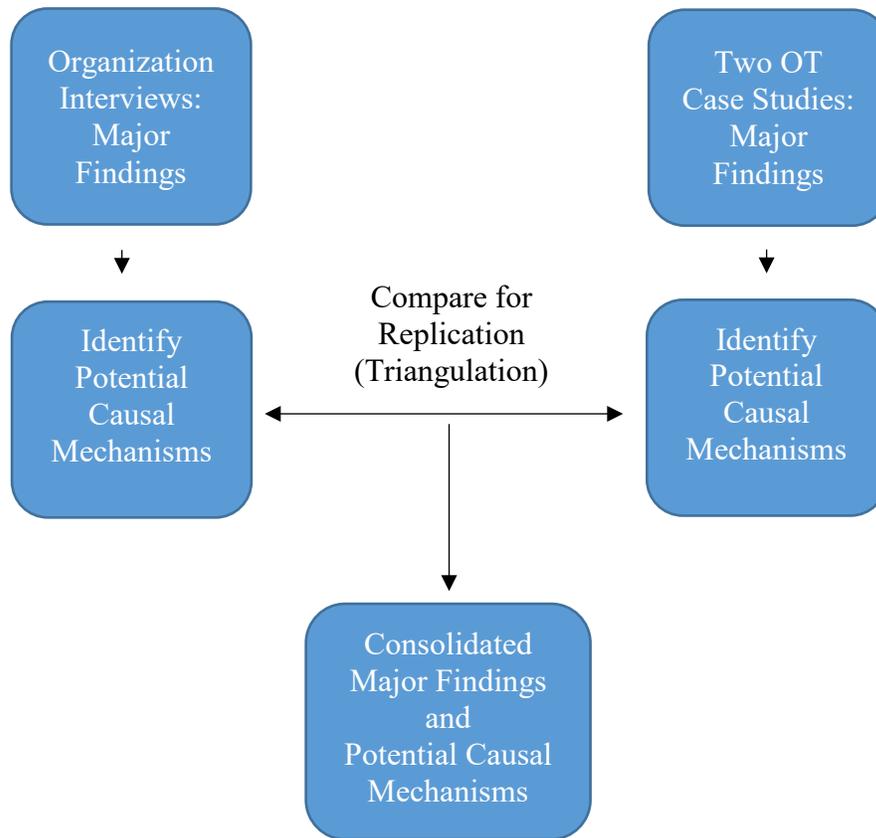
Yin (2009) takes a similar approach to Beach (2016). As mentioned previously, in what Yin refers to as the replication method of comparative case study, he recommends selecting cases representative of a homogenous population of other cases. The cases are studied with the goal to find mechanisms explanatory of the outcome that is the focus of the research. In this sense, the cases are assumed to be literal replications of all cases in the broader population. Yin suggests that even with a two-case study design, there is a possibility of direct replication of explanatory factors common to a larger population of cases. Viewing the two cases as independent experiments, results replicated in both cases will be more reliable than those coming from a single case.

Taking Yin and Beach together, a case study is a quasi-experiment, where the researcher tries to find explanatory variables for the research outcome of interest. The cases are representative of what is happening in the broader population cases. Thus, each case is viewed as an experiment, with conclusions that are deemed informative of what can be replicated in the population of cases. The researcher adapts Yin's and Beach's methods to use with the study's two-phase research design. Thus, the researcher expects that the major findings derived from the organization interviews will be replicated in the major findings of the OT case studies. Since the researcher theorizes that the major findings from the organization interviews might help explain

why DoD is not more widely using OTs, corroboration of these findings by the OT case studies will enhance the reliability of using the consolidated major findings to answer the research question.

The researcher considers each OT—the single OT in RSGS case study and the two OTs in the Living Foundries case studies—as an individual quasi-experiment. Thus, the unit of analysis is an OT. The goal of each “experiment” is to assess to what extent the major findings and corresponding potential causal mechanisms from the DoD organization interviews are replicated by the major findings and corresponding potential causal mechanisms from the OT case study. In this manner, the reliability the two-case comparative study design is enhanced by corroboration of the major findings of the organization interviews by the major findings of the OT case studies. This method appears to be dependable because the DoD OT program appears comprise a homogenous population of awarded OTs. The DoD organizations themselves are similar. All OTs are awarded under the same law and policies. It was fairly straightforward for the researcher—with the help of the participants—to select OTs representative of the population of OTs. The following Figure illustrates the process for how major findings and potential causal mechanisms from the organization and cases studies are compared (triangulated) to assess the level of replication and how this leads to the consolidated major findings and potential causal mechanisms.

Figure 6. Triangulation of the Organization Interviews Major Findings Using a Mechanistic Comparative Case Method



Source: Author.

As the Figure above shows, the major findings from the organization interviews are used to identify corresponding potential causal mechanisms. The same derivation process is used to identify potential causal mechanisms for the two OT case studies. Triangulation comprises comparing the potential causal mechanisms from the organization interviews to potential causal mechanisms from the OT case studies to figure the extent of mechanism replication. Since Chapter 6 explains that there is relatively high replication (~80%), triangulation is considered successful, and the researcher prepares a set of consolidated major findings and potential causal

mechanisms that reflect combining all major findings and potential causal mechanisms. The consolidated major findings and potential causal mechanisms are subsequently used in the interpretation, synthesis, and conclusions and recommendations sections in Chapter 6. The consolidated major findings are also used to prepare a narrative answer to the research question.

These uses of the consolidated major findings are covered in more detail in Chapter 6.

Therefore, the study adopts the mechanistic approach of Beach and the replication method of Yin to design a comparative case study method that is integrated into the study's two-phase research design and that is consistent with the study's pragmatist epistemology.

Non-selection of OT failures for the OT case studies

The OT case studies were chosen from a list of potential OT case studies recommended by participants. Participants identified possible OT case studies following their interview by the researcher. Appendix V provides the list of prospective OT case studies identified by participants. There are several advantages to relying on the participants to find potential OT case studies. First, it reduces researcher bias by relying on the participants to suggest suitable OT case studies. Second, it draws on the participants' expertise and experience to find potential OT case studies. Third, it helps give the researcher a sense of what OTs that participants had worked on, and thus discern the OTs that participants believed were representative to the larger population of DoD OTs.

The list of potential OT case studies in Appendix V includes several that were identified as successes—awarded OTs that are achieving their technical goals—and several that were failures, that didn't award, or that were awarded but didn't meet technical objectives. The failure

OTs are interesting because they suggest that the researcher could conduct a case study of a successful OT and contrast it with a case study of an unsuccessful OT, with OT success as a control variable. Success/Failure would have been an interesting control variable. This approach has been used in prior small-n interpretive studies (Druckman, 2005). From the perspective of a comparative case study research design, OT success contrasting a successful OT with a failed OT would have enabled the researcher to compare two different experimental outcomes—OT success and OT failure—to corroborate the research findings. And, as discussed above, Dunn (2009) prompted the researcher to consider using an OT failure such as the Army's FCS OT as a case study.

Nevertheless, the researcher decided not to use OT failures as case studies because those identified by participants turned out to be unsuitable for lack of data and available participants. For example, in 1995 DARPA tried to award an OT to the Multi-Chip Module fabrication consortium (Electronic News, 1995). This OT was planned to be a three-year \$15 million project aimed at reducing the cost of thin-film multi-chip module fabrication technologies. But the OT was not awarded because negotiations broke down when the consortium members could not agree to OT terms and conditions. The researcher decided not to use this as an OT failure case study because of how long ago it took place, 1995. The researcher could not find sufficient qualitative documents and participants that could provide data to make this OT a useful case study.

The problems of recency and lack of data influenced the researcher to decide not to use several other OT failures identified by participants, including the Heliplane OT (Daily, 2013). This was another OT by DARPA, this time with a nontraditional contractor. The project was for a 52-month \$130 million project to fly an experimental vertical takeoff and landing plane

capable of exceeding 300-knot airspeed. While this OT did get awarded, the project was canceled due to technical failure. The researcher decided not to use the Heliplane OT as a case study because, again, there were insufficient qualitative documents located and participants available who could provide useful data for a case study.

In the last ten years, DARPA has awarded several OTs for the Hypersonic Transport Vehicle (HTV) program (DARPA, 2010). HTV-1 and HTV-2 were hypersonic air vehicles built by DARPA to field-test hypersonic technologies for DoD military applications. The goal of these OT projects was to develop technologies that could cause hypersonic air vehicle capabilities that could reach anywhere in the world in less than an hour. HTV-2 flew in 2010 with mixed technical results. While these OTs did get awarded, they were failures in the sense they did not achieve some of their major technical objectives. The researcher decided not to use the HTV OTs as case studies, again, because of the lack of participants to provide data about the projects.

The Army FCS program is regarded as the most famous failed OT (POGO, 2017). The continuing impact of this supposedly failed OT on the overall DoD OT program is one of the study's major findings reported in Chapter 4 and discussed in Chapter 6. Thus, a brief summary of the FCS program is provided to give historical context for this notable failed OT.

The FCS program started in 2003 based on the Army's recognition that it needed more agile, networked ground forces to replace the Army's traditional heavy armor such as the M-1 Abrams main battle tank and the M-2 Bradley fighting vehicle (Feickert, 2005, Summary). The program envisioned a family of eighteen lightweight manned and unmanned ground and air systems that would be linked using an advanced computer network architecture. In this system of systems approach, the FCS would be "As good as or better than the Army's current force in

terms of lethality, survivability, responsiveness, and sustainability” (Feickert, 2009, p. 1). The program ambitiously planned to field fifteen FCS brigade combat teams equipped with new FCS Manned Ground Vehicles by fiscal year 2025. The projected overall cost of the FCS program exceeded \$25 billion (Gilmore, 2006).

In 2003, the Army awarded an OT to Boeing to act as the lead system integrator for the FCS program (GAO-05-442T, 2005). But the program soon faced mounting technical challenges and increasing costs. As a result, in March 2005, the SASC held a hearing about the FCS program. At the hearing, Senator McCain sharply criticized the FCS program. His main objection was that awarding an OT instead of a traditional procurement contract reduced government oversight of Boeing’s performance (Mundy, 2005). Senator McCain thereafter wrote to the Secretary of the Army to express his concerns about the FCS program: “Even after the hearing, I remain concerned about some aspects of FCS, most notably the use of an Other Transactions Authority (‘OTA’) as the contract vehicle for the program” (McCain, 2005, p. 1). Senator McCain noted that the OT did not include key cost, procurement integrity, and other provisions found in the traditional procurement agreements. The Senator concluded: “Since the traditional protection for the public trust doesn't exist for OTs, by not keeping these key protections, I am concerned the Army has not adequately protected taxpayers’ interest” (McCain, 2005, p. 3).

In response to Senator McCain’s concerns, and in view of FCS program cost and schedule issues, The Secretary of the Army directed that the program be restructured, including changing the OT to a traditional procurement contract that included cost or pricing, procurement integrity, and other FAR clauses as administrative safeguards (Army Public Affairs, 2005). This effectively spelled the end of the FCS program. The successor to the FCS program is called the

Army Brigade Combat Team Modernization (ABCTM) program, which is tasked with developing and fielding a new Army Ground Combat Vehicle and spinning out remaining FCS technologies to Army combat organizations (Feickert, 2009, p. 1). Boeing is not the prime contractor for the ABCTM program.

The researcher decided not to use the FCS OT as a case study. The demise of the FCS program is well documented in the prior OT literature (POGO, 2017). The FCS OT took place a decade ago, and the researcher believed it would be difficult to find enough participants and qualitative documents to support a case study that would be useful to the overall research design. Thus, the FCS OT, while quite interesting and part of a consolidated major finding for the study, was not selected as an OT case study.

Selection of OT case study participants

Participants for the OT case studies are not limited to former and current DoD officials and consortia officials. Instead, the researcher tries to include contractor interviews as part of the OT case studies because a goal of the case studies is to interview key employees involved the ongoing performance of the OTs. This covers DoD employees such as the program manager and contracting officer, but also included several contractors such as support contractors and personnel from the OT contractor. It additionally includes OT consortium contractors. This approach helps the study gather a broad scope of data for corroborating the findings from the organization interviews.

Because small numbers of people involved in each of the OT case studies, and because the personnel knew each other, it was easier for the researcher to gain informed consent from

participants in the OT case studies than it was for participants in the DoD organization interviews. Thus, as discussed above, the study is able to gather information from a homogenous sample of participants that were involved in performing the OTs selected for the case studies.

Selection of two OT case studies

The researcher tries to find case studies that could best leverage the mechanistic/replication multiple case study method of Yin (2009) and Beach (2016) discussed above. Thus, using the list of OTs identified by participants as appropriate for case studies, the researcher tries to pick two OTs that have the following characteristics. First, the OTs had to be taken from the population of OTs recommended by participants. From this population, the researcher focuses on selecting ongoing OTs that have successfully achieved at least some of their technical objectives. The purpose for this is because the researcher believed that participants working on successful, ongoing OTs have more potentially relevant information to discuss than for failed OTs. Since the DoD OT program is focused on attracting nontraditional contractors, two of the selected OTs were for nontraditional contractors. To improve the corroborative utility of the case studies, the second OT case study is for a traditional contractor. Thus, a control variable—type of contractor, traditional or nontraditional—is used to help improve the reliability of the case study findings.

Pragmatically, the researcher focuses on identifying OT case studies that had available qualitative documents for review, and that is likely to provide the researcher with access to participants that were involved in negotiations and administration of the OT. This meant that the researcher, who works at DARPA, is interested in selecting DARPA OTs. This also meant that

the researcher focuses on identifying previously awarded, ongoing OTs for projects that are successfully meeting their technical objectives.

The researcher does not select the OT case studies because the OTs are significant or unusual, for instance, the FCS Boeing OT discussed previously. McNabb (2008) recommends that case studies must be significant, for instance, illustrating a point in a better or more succinct way than other cases that could have been chosen. Yin recommends that a case study must be significant, meaning it must be of public interest or unusual. Instead, consistent with Yin (2009) and Beach (2016), the researcher tries to select OT case studies representative of the OTs identified by participants and the larger population of DoD OTs. By doing this, the researcher hopes that findings from the case studies will represent the population of DoD OTs. This might improve the ability of the OT case study findings to corroborate the organization participant interview findings.

With these characteristics and limitations in mind, the researcher selects OTs that are ongoing, that are meeting their technical objectives, and that are awarded by DARPA. Thus, the researcher picks the RSGS OT as the traditional contractor OT case study and two Living Foundries OTs as the nontraditional OT case study. These OTs are awarded, ongoing, and are successfully meeting their technical objectives. The researcher had good access to qualitative documents and participants willing to discuss their experiences in negotiating and administering these OTs. So, the choice of the OT case studies focuses on OTs identified by the participants and that have identifying characteristics that facilitated collecting data that would be useful in corroborating the findings from the organization interviews. DARPA OTs with two nontraditional contractors (Living Foundries) and a DARPA OT with a traditional contractor

(RSGS) were selected because the control variable—contractor type—might improve the reliability of the OT case study findings.

Data Analysis and Findings

This section discusses how the study's coding scheme and conceptual framework were used to help analyze interview data and thereby derive the study's major findings.

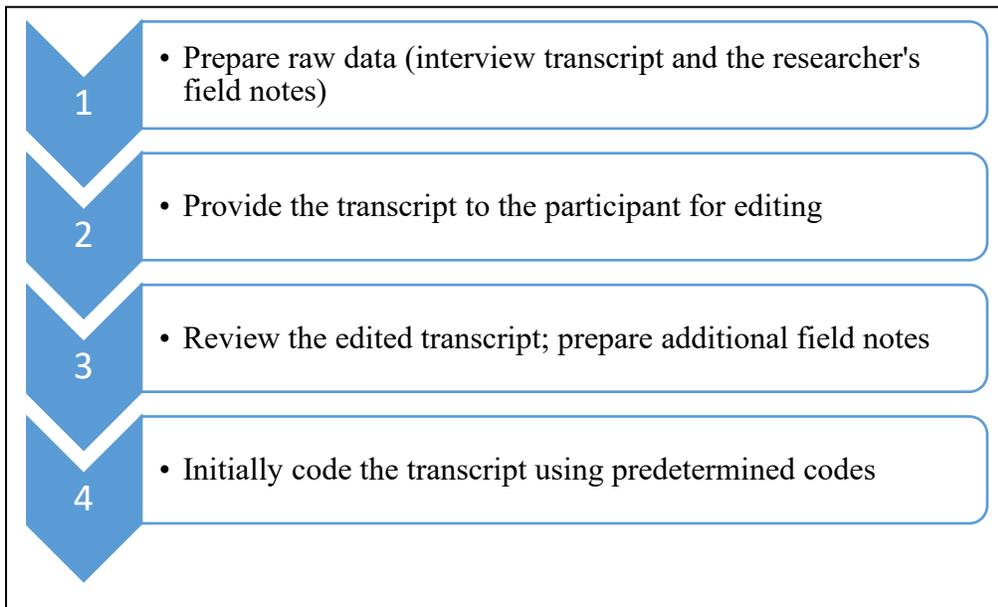
Process for organizing the participant interview data for initial coding

Interview data was the primary data collected for the study. A significant amount of interview data was collected and transcribed verbatim. The researcher faced the challenge of transforming this data into something meaningful that could be analyzed to answer the research question and be interpreted and synthesized to support study conclusions and recommendations. The researcher approached this task by breaking the data down into smaller units—manageable chunks—that enabled the researcher to understand what the data was saying. To break down the data into such chunks, the researcher developed a coding scheme. The coding scheme is based on the category descriptions in the conceptual framework and followed the sequence of the interview questions.

The study uses coding and basic content analysis to analyze data. To organize participant data for coding, the researcher transcribed the interviews and associated field notes (Creswell, 2014). Next, the researcher provided the interview transcript to the participant and invited the participant to review and edit the transcript for accuracy. Most participants made minor edits to

their transcript that improved its accuracy. The researcher then examined the edited transcript to get a general sense of its overall meaning. The researcher prepared additional field notes based on this review. These notes aided in analyzing the transcript data to make findings. The interview transcripts are initially coded using a coding scheme consisting of predetermined codes and predetermined sub-codes. The Figure below shows the process for preparing raw data for initial coding.

Figure 7. Process for Organizing Raw Interview Data for Initial Coding



Sources: Process adapted from Bloomberg (2012) and Creswell (2014).

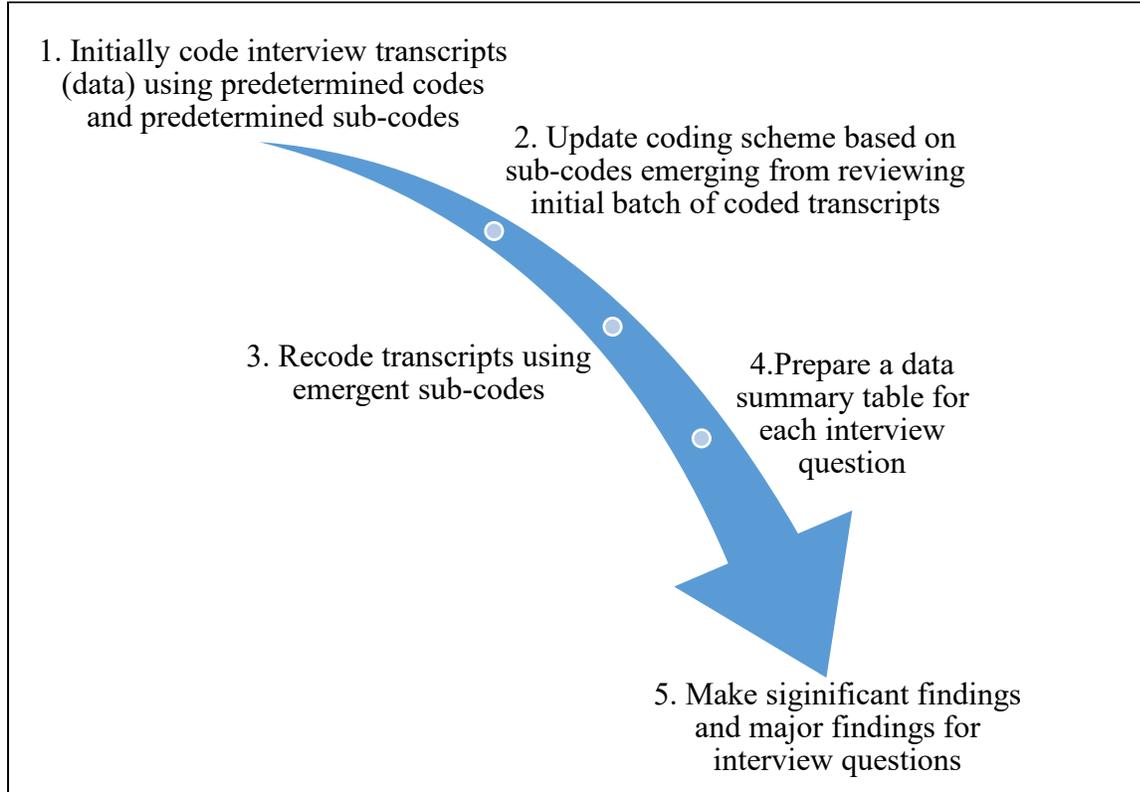
Process for data analysis and making findings

As discussed below, the researcher uses a combination of predetermined codes and predetermined sub-codes based on the prior literature and the researcher professional experience.

The coding scheme is augmented by emergent sub-codes that are prepared based on reviewing the initial batch of organization interview transcripts. Thus, the coding process is iterative and reflected insights that emerged from reviewing the interview transcripts. The coding process is used with data summary charts to prepare significant findings for each of the research questions, which are derived as objectively as reasonably possible using only data from the interview transcripts. Thus, the significant findings reflect what the participants said in response to the interview questions, not what the researcher interpreted they said. Data summary tables are discussed and presented in Chapter 4 for the organization interviews and in Chapter 5 for the OT case studies.

The significant findings are augmented by direct quotations from the interview transcripts, as necessary to illuminate discussion of the finding. The data summary tables enabled the researcher to give basic descriptive statistics to emphasize whether a majority or minority of the participants supported specific findings. Thus, for the organization interviews and the interviews for the OT case studies, the process for data analysis and findings included the four steps illustrated in the Figure below.

Figure 8. Process for Data Analysis and Findings



Sources: Process adapted from Bloomberg (2012) and Creswell (2014).

In the first step of Figure 8 above, the researcher coded the transcript data using predetermined codes and predetermined sub-codes. Predetermined codes are based on the category descriptions in the conceptual framework and followed the descriptions of the conceptual framework discussed in Chapter 2 and the interview questions discussed in Chapter 1. The predetermined codes were prepared using the prior literature and the researcher's professional experience. Initial coding was contingent in the sense it was expected that the predetermined codes would need to be updated as new information emerged from coding the data and reviewing the first batch of interview transcripts. This expectation turned out to be true.

In the second step of Figure 8 above, the researcher updated the coding scheme and the conceptual framework based on codes that emerged from coding the data. These are called

emergent sub-codes. Thus, the interview transcripts are coded twice to improve data analysis reliability. To develop the emergent sub-codes, the researcher used the predetermined coding scheme as a guide. The researcher reviewed the initial batch of interview transcripts and organized all initially coded segments into groups representing similar themes. For instance, a theme for Interview Question 3b was organization culture disadvantages of OTs compared to traditional procurement agreements. This theme was labeled with a descriptive acronym—‘CUL’—that became the emergent sub-code for all initially coded transcript segments grouped under the theme.

In the third step of Figure 8 above, the researcher used the emergent sub-codes to re-code all segments of the interview transcripts that were coded in the first step with predetermined codes. This enabled the researcher to break the initially coded data down into more manageable chunks, with the chunks of data from different respondents aggregated by theme. Using a combination of predetermined codes and emergent sub-codes, the researcher is able to organize the data in a manner that reflected the prior literature (predetermined codes), the researcher's professional experience with OTs (predetermined codes), and the participant's responses to the interview questions as reflected in the initial batch of interview transcripts (emergent sub-codes).

In the fourth step of Figure 8 above, the researcher prepared data summary tables for each interview question. The data summary tables are used to organize common responses to interview questions from each of the participants. The participants are listed on the Y-axis of the table, and typical interview responses are recorded on the X-axis of the table. The researcher used the data summary tables to give an overall sense of what participants responded to each interview question, including the frequency of responses. The data summary tables were a tool to help the researcher report the most significant findings based on what the participants had to

say in response to each of the interview questions. For example, due to the large volume of data collected during the interviews, the data summary tables help the researcher summarize the most frequent participant responses to the relevant interview question. As discussed in the section below, the researcher determined that a reliable method for reporting the findings was to analyze the most frequent responses—by emergent sub-code—for each subsidiary interview question. The data summary tables are presented and discussed in Chapter 4 for the organization interviews and in Chapter 5 for the OT case studies.

In the fifth step of Figure 8 above, using the data summary tables as a guide, the researcher tries to make objective significant findings for the subsidiary interview question and major findings for the main interview questions. The major findings represent the combined significant findings for the interview question. The findings are reported in narrative form. The focus while making the findings was to be unbiased, namely, to avoid adding any researcher viewpoints in the findings. Thus, all the findings are based on what the participants said in response to the interview questions, not what the researcher thought they said. Thus, the researcher removed any personal bias from this process—specifically, the researcher did not include his interpretive gloss to the findings. The researcher provided his interpretive input as part of the synthesis discussion. The synthesis process is discussed below.

The researcher also looked for general themes and patterns in the findings, for instance, by noting the frequency of specific responses by the participants. The response frequencies are included in the data summary tables for each interview question and are discussed and presented in Chapter 4 and Chapter 5. The purpose of this basic content analysis was to figure the most critical finding for each interview question according to the frequency of the finding being discussed by the participants. Chapters 4 and 5 report the significant findings based on

frequency of participant coded response, namely, the most frequently coded responses are reported for each subsidiary interview question. The rationale for using this frequency of response analysis method is discussed in more detail below.

The researcher makes several major and significant findings per interview question. The significant findings are aggregated to prepare corresponding major findings for each interview question. The findings are supported by relevant quotations from the interview transcripts. These quotes aids in illustrating the representative opinions of a group of the participants that generally made similar remarks on a matter relevant to the interview question. Thus, by using the data summary tables and selected direct quotations from the interview transcripts themselves, the researcher tries to offer a series of findings for each of the interview questions that represented what the data was saying. The researcher attempts to depict the findings in a sequential order for each interview question, including identifying what the data appeared to represent as the most significant finding in response to each interview question.

Chapter 6 uses the consolidated major findings to support interpretation and synthesis of the data. The conceptual framework and the coding scheme are critical parts of the research design and the main methodological tools that the researcher used to analyze, interpret, and synthesize study data and to answer the research question. For example, Chapter 6 uses the conceptual framework to organize the interpretation discussion. Therefore, the coding scheme and conceptual framework are discussed in more detail below.

Conceptual framework

Bloomberg (2008) discusses that a study's conceptual framework is the centerpiece of managing data. The conceptual framework is presented in Chapter 2. As discussed in Chapter 2 and illustrated in the Figure 5 above, the conceptual framework has a central role in organizing data collected during the study. Data collected comprises participant interview data and OT case study data. But data also includes a variety of qualitative documents—policies, regulations, and so forth—related to organizations that are taking part in the DoD OT program. Data further includes technical information related to the projects that are being conducted under the OTs for the case studies. Although not data, the researcher also reviews prior scholarship from the OT and historical institutionalism literature to inform the study.

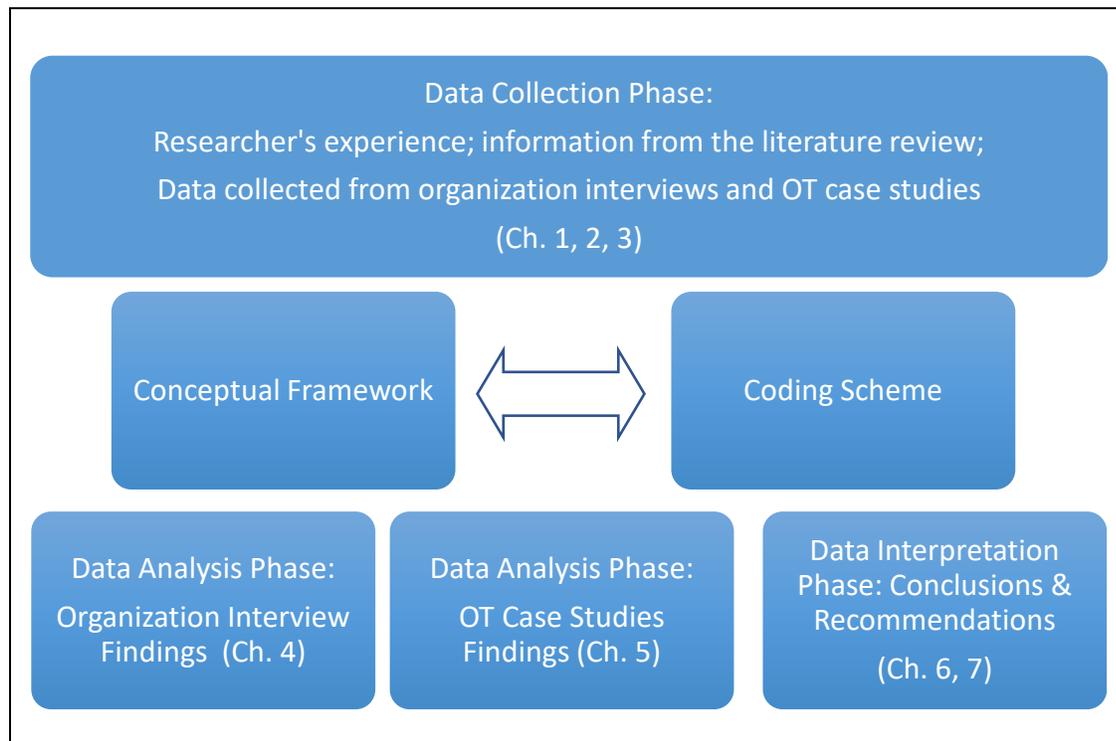
The conceptual framework is used to organize all of this data and literature so that the researcher can make sense of it and answer the research question. The conceptual framework serves as a scaffold for organizing the dissertation chapters. Thus, the researcher conceives the conceptual framework as a tool for connecting of all significant parts of the study together. Figure 5's illustration of the study's two-phase research design clearly shows the centrality of the conceptual framework in the data collection and data analysis and interpretation phases of the study.

The data collection phase of the study relies on the researcher's professional experience, information from the literature review and data from the participant interview and case studies. Chapters 1, 2, and 3 cover the data collection phase of the study. To aid in analyzing data, the conceptual framework is used to develop the predetermined coding scheme. Figure 5's illustration of the study's two-phase research design above illustrates how the conceptual

framework and coding scheme link the data collection phase and the analysis and interpretation phase of the study. The conceptual framework and coding scheme are used to organize data from these phases so that the researcher could analyze and interpret data.

The data analysis and interpretation phase of the study encompasses collecting data from the organization interviews and the case studies and synthesis of the data to support study conclusions and recommendations. The data analysis and interpretation phase is discussed in Chapters 4, 5 (data analysis), and 6 (interpretation and synthesis). The following Figure illustrates the relationship between conceptual framework and the data collection phase (Chapters 1, 2, and 3) and the data analysis and interpretation phase (Chapters 4, 5, 6, and 7).

Figure 9. Relationship of the Conceptual Framework and the Coding Scheme to the Study Phases



Source: Author.

As illustrated in the Figure above, the data collection phase of the study draws on the researcher's experience, the literature review, and data collected from participants and the OT case studies. The researcher's experience and the OT literature review are used to write Chapter 1. The OT literature and historical institutionalism literature reviews are used to write Chapter 2. Data from the pilot interviews and first several organization interviews are used to write this chapter. The OT case studies were identified with the help of participants, following their interviews. All of this information and data is used to prepare the conceptual framework that is discussed at the end of Chapter 2. Thus, the researcher uses the data collection phase of the study to build a conceptual framework which then served as scaffolding and a data repository for organizing data collected from organization interviews and the OT case studies. The coding scheme is integrated with the conceptual framework. Chapters 4, 5, 6, and 7 are written using all prior literature, qualitative documents, and interview data collected and stored in MaxQDA and Bookends for Mac, and that are organized using the conceptual framework.

As discussed in Chapter 2, the conceptual framework includes five conceptual framework categories, one corresponding to each of the study's five interview questions. These categories form the backbone of the study and are critical to helping the researcher organize, analyze, and interpret the study data. As explained below, the conceptual framework categories act as data repositories for presenting the study's findings. Each conceptual framework category includes a description that was developed using participant data that emerged from the two pilot interviews and an initial batch of organization interviews.

The category descriptions are also informed by the researcher's professional experience in the DoD OT program. Each of the conceptual framework categories is cross-referenced to the prior literature to make sure that the categories reflected the teachings of the prior literature. The

goal of developing the conceptual framework in this manner is to make it a useful repository for all data collected during the data collection phase of the study. The conceptual framework is a working tool and remained flexible during the study.

As further discussed below, the final coding scheme follows the conceptual framework categories. The codes of the coding scheme follow the conceptual framework which was prepared using the researcher's professional experience, the literature review, the pilot interviews, and an initial batch of organization interviews. Thus, the final coding scheme is used to organize the organization and case study data in a manner that make it easier for the researcher to interpret it given the researcher's prior experience, the literature review, and data from the pilot and first seven participant interviews.

As illustrated in Figure 9, the analysis and interpretation phase of the study includes the findings for the organization interview and the OT case studies. The findings are based on participant and OT case study data and organized to follow the five categories of the conceptual framework. Since each the conceptual framework category corresponds to one of the five interview questions, the findings are directly correlated to the interview questions. This phase of the study also includes the conclusions and recommendations.

Thus, the analysis and interpretation phase of the study makes findings that follow the categories of the conceptual framework. The data analysis and interpretation of the study interprets the findings given the researcher's experience and the prior literature, both reflected in the conceptual framework. So, the conceptual framework serves as the centerpiece repository for collecting and organizing study data and as a tool to analyze, interpret, and synthesize the findings to answer the research question and support the study's conclusions and recommendations.

Coding scheme

This section discusses how the researcher developed and uses the study's coding scheme to organize and make sense of data. The coding scheme is primarily used to analyze data collected in the organization interviews (Chapter 4) and the OT case studies (Chapter 5).

Development of the coding scheme

The study's coding scheme was developed in view of the prior literature on coding. The researcher surveyed this coding literature as part of developing the coding scheme for the study. (Leech & Onwuegbuzie, 2007; Cotton, 2016; Campbell, Quincy, Osserman, & Pederson, 2013; Graneheim 2003; Baralt, 2012). Following the teachings of this literature, the study uses a combination of inductive (predetermined) and deductive (emergent) coding to organize and analyze the data. Thus, the study uses what Leech (2007) refers to as abductive coding, Cotton (2016) terms inductive coding, Campbell (2003) calls free coding, and what Baralt (2012) discusses as hybrid coding in the prior literature discussion above. The study's coding scheme was developed over a period of several months and was periodically updated based on lessons learned and new information as the study progressed. Appendix W provides the coding scheme development record, which summarizes the steps and rationale for this development process.

The predetermined codes were developed as follows. First, the researcher prepared predetermined codes and sub-codes based on his professional knowledge of the DoD OT program and the research questions. The researcher updated the coding scheme based on the review of the prior literature topics. Before the prospectus defense, the researcher conducted two

pilot interviews to help refine the coding scheme. The coding scheme was updated based on what was learned in the pilot interviews. The coding scheme was also updated after the prospectus defense. Following IRB approval of the study, the researcher conducted initial organization interviews. Finally, the predetermined coding scheme was updated based on data from the initial batch organization interviews.

Appendix W summarizes additional updates to the coding scheme and demonstrates how the coding scheme evolved as field research progressed. Thus, as discussed in the first step of the process illustrated in Figure 8, the researcher augmented the predetermined codes with sub-codes that emerged from reviewing the initial batch of interview transcripts. Figure 8 also illustrates that the interview transcripts were coded twice to improve data analysis reliability. Using the predetermined coding scheme as a guide, the research reviewed the transcripts and organized the transcript data into groups representing similar themes. These themes were labeled with a descriptive name that became the emergent sub-codes. The researcher used these emergent sub-codes to re-code all segments of the interview transcripts that were coded in the first step using predetermined codes.

As mentioned, the researcher recorded the development of the coding scheme to track how coding evolved as the study progressed. The coding scheme development record is provided in Appendix W. To help code data, the researcher also prepared descriptions of each of the coding scheme factors and subfactors. Appendix X provides the predetermined coding scheme factors and subfactors descriptions. Appendix Z provides the study's final coding scheme, showing all predetermined codes and emergent sub-codes. Thus, Appendix X is the study's final coding scheme.

How MaxQDA and Bookends for Mac software helped organize the study data

Creswell (2014) and Bloomberg (2012) recommend that computer software programs can be used aid in qualitative data analysis but are not a substitute for the researcher conducting the analysis. Following these recommendations, the researcher used MaxQDA, a commercial qualitative data analysis software program to help in developing the coding scheme and coding and organizing the study data. This software program serves as a repository for interview transcripts, the coding scheme, the coding scheme descriptions, and the researcher's field notes.

The researcher used Bookends for Mac, a commercial citations management software program, to help with citing prior literature and for storing electronic copies of prior literature, field notes, and other study data. Thus, study data is stored and organized using these two software programs. As discussed above, the conceptual framework is used to organize the study data in these commercial computer software programs. For example, the interview transcripts are coded using MaxQDA and a coding scheme that follows the organizational scheme of the conceptual framework.

Analysis using the frequency of coded responses

The data analysis process discussed above is used to organize the data, thereby following Creswell's guidance that "the major intent of data analysis is to make sense out of text and image data" (Creswell, 2014, p. 195). Coding helped the researcher make sense of the data. But coding did not substitute for the researcher's duty to immerse himself in the data so that he could use his judgement and instincts on what is the most relevant data for deriving the findings. So, coding

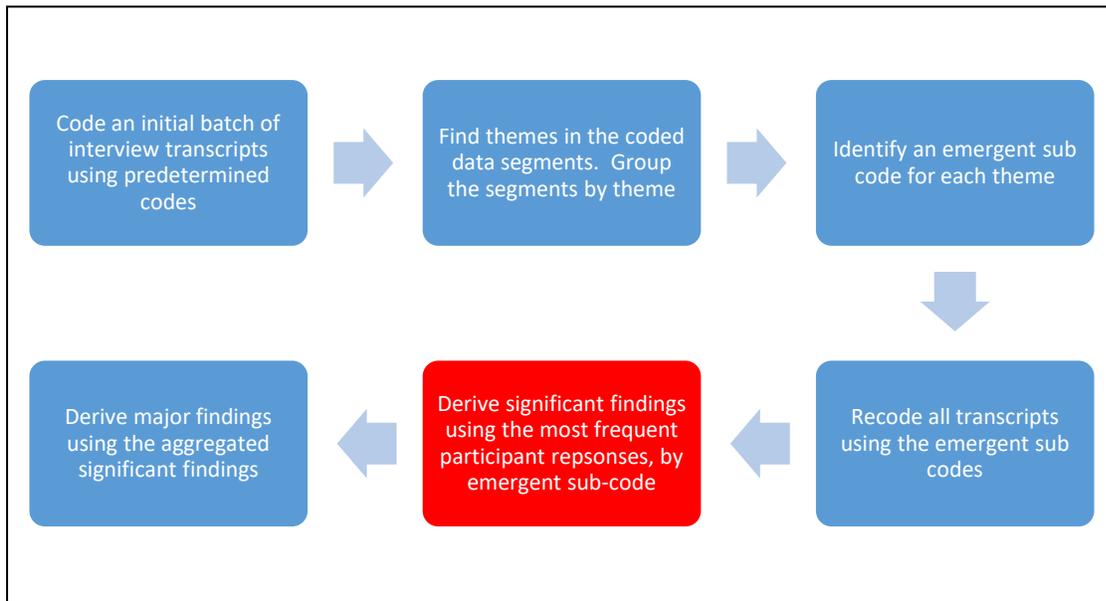
was merely a tool to help the researcher organize the data. It did not replace the researcher's role as an instrument to make sense of the data.

Coding was very helpful in organizing the data for analysis. But even after the data was coded, the researcher still found it difficult to make significant findings for the subsidiary interview questions which could lead to reliable major findings for the interview questions. So, while coding was a useful tool, it did not change the fact that the interviews transcripts comprised a large amount of data to organize, understand, and derive reliable findings.

Based on being immersed in the data over a period of months, to help make reliable major findings, the researcher decided to analyze the interview data by using the most frequent responses to each interview question. The researcher believes this would focus the analysis on what themes the participants talked the most about. One assumption underlying this method is that the themes the participants most frequently talked about are likely the themes they believed were most relevant to answering the interview questions. Another assumption is that this method would reduce researcher bias because the researcher would be initially removed from judging what themes were most relevant to answering the interview questions.

Thus, the major findings for the organization interviews in Chapter 4 and the case study interviews in Chapter 5 are based on an analysis of the most frequent responses to the interview questions. The following Table illustrates where this frequency method of content analysis fit into the overall data analysis process.

Figure 10. Where the Frequency Method of Content Analysis Fits Into the Overall Data Analysis



Sources: Bloomberg (2012) and Creswell (2014).

To illustrate how the frequency method is implemented, the following Table is a summary of the coded responses for Interview Question 3c of the organization interviews in Chapter 4. The x-marked boxes show that at least one segment of the interview transcript for the participant was coded using the denoted emergent sub-code.

Table 16. Organization Interviews: Data Summary Table for Interview Question 3c

Interview Question 3c: How do disadvantages of OTs impact use of OTs in other DoD organizations?

Conceptual Framework Category: OT disadvantages versus TPAs

Participant Interview #	Participant Identifier	Emergent Sub-Code: EXP*	Emergent Sub-Code: NEG*	Emergent Sub-Code: CUL*
1	DARPA1			x
2	DARPA2	x		x
3	AFRL	x		x

4	DARPA3			x
5	DARPA4		x	x
6	DIUX	x		x
7	AFHQ			x
8	OSD			x
9	SPAWAR			
10	PIC			x
11	NSC	x	x	x
12	DTRA			x
13	NAVYHQ			x
14	DOTC	x		x
15	TARDEC		x	x
16	MDA			
17	SCO		x	
18	PEO-CBD			
19	SOCOM			
20	DPAP		x	
TOTALS		5 of 20 (25%)	5 of 20 (25%)	14 of 20 (70%)

Source: Appendix AA.

* Per Appendix Z, the emergent sub-codes in the Table above had the following meanings:

- EXP–OT disadvantages impacts on OT experience in other DoD organizations.
- NEG–OT disadvantages impacts on OT negotiation and administration in other DoD organizations.
- CUL–OT disadvantages impacts on culture in other DoD organizations.

Based on the data summary in the Table above, the researcher analyzes question 3c using the most frequent responses by sub-code—namely, the CUL-coded responses. The Table shows that 14 of 20 (70%) of the participants made interview remarks coded with CUL, meaning they most frequently talked about the impacts that disadvantages have on the culture of DoD organizations. Thus, the significant findings for Interview Question 3c reflect an analysis of the CUL-coded responses. For Interview Question 3c, the researcher does not analyze the responses for the other emergent sub-codes as part of the analysis of question 3c. Thus, for Interview Question 3c, analysis does not draw on the EXP or NEG coded responses in the Table above.

The researcher applies the same frequency method to analyze data for all the other interview questions. Where an interview question has several sub-codes with equal highest frequency of response, all responses in the sub-codes are analyzed. For example, Appendix CC provides the following data summary for Interview Question 5a for the RSGS OT case study.

Table 17. RSGS Case OT Study: Data Summary Table for Interview Question 5a

Interview Question 5a: What factors in your organization could be changed to impact use of OTs?

Participant Interview #	Participant Identifier	Emergent Sub-Code: EMPLY*	Emergent Sub-Code: LDR*	Emergent Sub-Code: TRNG*
1	RSGS1		x	
2	RSGS2			
3	RSGS3	x		x
4	RSGS4		x	x
5	RSGS5		x	x
TOTALS		1 of 5 (20%)	3 of 5 (60%)	3 of 5 (60%)

Source: Appendix CC.

* Emergent sub-codes are defined in Appendix Z.

The Table above shows that LDR and TRNG sub-codes are tied for the most frequent responses (60%), by sub-code. Thus, the analysis for Interview Question 5a draws on data coded in both of these sub-codes. It does not draw on the EMPLY coded responses.

Frequency of response is not the only method that the researcher considered for analyzing the interview data. There are several other content analysis methods that the researcher considered but decided not to use. For example, the researcher could have analyzed all coded segments and used his own judgment to initially figure which segments are the most relevant to

making significant findings. Thus, in Table 16 above, the researcher could have initially selected what he judged to be the most relevant coded segments from the EXP and NEG categories. In Table 17, he could have included responses coded with EMPLY sub-code. But the researcher decided not to use this method because he believed it could run contrary to the qualitative research principle that “findings should be presented as objectively as possible and without speculation; that is free from research bias” (Bloomberg, 2012, p. 109). Since the researcher is concerned that his professional experience in the DoD OT program could bias making objective findings, he decided not to risk introducing added researcher bias into the study findings by using his subjective judgment to select what coded segments were most relevant to data analysis. Thus, the frequency method helps to minimize researcher bias.

Second, the researcher could have word-searched all the coded segments find the most relevant coded segments for analysis. For example, the researcher could have used words from the research question or the research hypothesis and based analysis on segments that included these words. But the researcher decided not to use this method since it would have presumed that the research question and hypothesis encompassed the most important things the participants said. The study is exploratory, and the research question and hypothesis were formulated well before the interviews were conducted. The researcher concludes that the word search method might skew the findings towards too narrowly answering the research question and towards unreliably confirming the research hypothesis.

Third, the researcher could have grouped coded segments by historical institutionalism concept such as path dependence, endogenous institutional change, and so forth. But the researcher decided not to use this method for analysis, since it would have assumed that these concepts applied to the DoD OT program and thus, by inference, to the interview data. The

researcher did not make this a process about the concepts of historical institutionalism.

Nevertheless, the synthesis discussion in Chapter 6 uses this general approach by discussing each of the major concepts of historical institutionalism using study's major findings and the researcher's perspectives. So, the concepts of historical institutionalism are carefully considered in the context of the synthesis discussion of the consolidated major findings, but not for data analysis and deriving the major findings.

Fourth, the researcher could have analyzed all the sub-coded segments. Thus, for interview question 3c in Table 16, the researcher could have analyzed all coded segments for the EXP, NEG, and CUL code categories. At first, this approach seemed to have merit since it would have been considered all coded data. The researcher experimented with this method when he was initially analyzing the interview data. But the analysis was overly long and, in some instances, redundant. The researcher found that the sheer volume of coded data made it challenging to reliably distill findings from the data if every coded segment was considered. So, the researcher decided not to use this method. Nevertheless, the interpretation discussion in Chapter 6 uses this general approach by discussing each of the consolidated major findings by drawing on all the coded data for the interview questions. So, all the coded data are carefully considered in the context of the interpretation discussion of the consolidated major findings, but not for data analysis and deriving the major findings.

The researcher also considered whether using only the most frequently coded responses for analysis would miss important data. In Table 16, for example, the researcher reflected on whether there were coded participant remarks in the less frequently coded responses—namely, in EXP and NEG sub-code categories in Table 16—that, if used, would have significantly changed the major findings. To reduce the potential for missing important data in the less frequently

coded responses, the researcher reviewed all one-line descriptions of participant remarks prepared while developing the emergent sub-codes. About 1,300 segments of the interview transcripts are coded. As discussed in Chapter 4, to formulate emergent sub-codes the researcher prepared one-line descriptions of all code segments to help group the segments into themes. These themes became the emergent sub-codes. Appendix Y provides an example of the one-line descriptions. These one-line descriptions of the code segments are also used during analysis to make sure that using the most frequently coded responses did not miss important participant remarks in other sub-codes. Thus, the researcher reviewed the one line code descriptions summarized in Appendix Y (Interview Question 3c) for the less frequently coded NEG and EXP coded responses in Table 16 above. Based on the review, the researcher determined that analysis of the most frequently coded responses (CUL sub-code) provides reliable analysis results for Interview Question 3c.

The researcher also considered whether using a frequency method was appropriate given the sample size. The study interviewed 20 participants at DoD organizations (Chapter 4) and ten more participants for two OT case studies (Chapter 5). The researcher reflected on whether the sample size (30 participants) was large enough to for the frequency of response method to lead to reliable major findings. Although the researcher was unable to answer this question conclusively, he determined that the frequency method was reliable based on the triangulation results discussed in Chapter 6.

Briefly here, the major findings from the OT case studies are used to triangulate the major findings from the organization's participant interviews. While all interviews use the same research questions and interview protocol, the organization interviews, and case study interviews involve different sets of participants, with no overlap. Further, while the organization interviews

involve a nationwide sample of policy, contracts, legal and other employees, the case study interviews are more focused and sampled employees that are directly engaged in negotiating and administering specific OTs. Thus, the organization interview and case study interviews involve distinct samples of participants.

The sample size seems proper because there is a reasonable convergence between the major findings of the organization interviews and the case study interviews. All interview data are analyzed using the frequency method discussed above. Chapter 6 discusses that there was a significant replication of major findings between the organization interviews and the case study interviews. In other words, the frequency method results in significantly similar major findings for entirely separate samples of interviewees. This seems to show convergent validity of the findings because frequency analysis of several distinct groups of participants yields significantly similar major findings. The idea of convergent validity is well established in the qualitative research and holds that “when independent measures of a phenomenon are employed and yield similar results, the causal claims, whole not proved, are stronger” (Bozeman, D.M., 2016, p. 750).

As discussed in Chapter 6, there is a ~80% replication level of potential causal mechanisms and related major findings across the organization interviews (Chapter 4) and the case study interviews (Chapter 5). These convergent phenomenon—potential causal mechanisms and major findings—across independent samples of participants (e.g., organization participants discussed in Chapter 4 and the participants discussed in Chapter 5) increase the researcher’s confidence that the consolidated major findings are reliable. Since the frequency method is the analysis method used to arrive at these convergent findings, the researcher is reasonably confident that the frequency method is appropriate given the sample size.

Additionally, the researcher notes that the high level of replication of major findings was supported by similar replication of the most frequently used emergent sub-codes across the organization and OT case study interview transcripts. As discussed above and in Chapter 4, the emergent sub-codes are based on a review of the initial batch of interview transcripts. These emergent sub-codes are used to re-code all initially coded transcripts. The following Table shows the most frequently used emergent sub-codes for the organization interview and OT case studies for each subsidiary interview question.

Table 18. Comparison of the Most Frequently Used Emergent Sub-Codes
(Numerical data shows the percentage of participants that made interview responses coded with the indicated emergent sub-code)

Interview Question	Most Frequently Used Emergent Sub-Codes for Coding the Organization Interviews (Chapter 4)	Most Frequently Used Emergent Sub-Codes for Coding the RSGS OT Case Study (Chapter 5)	Most Frequently Used Emergent Sub-Codes for Coding the Living Foundries OT Case Studies (Chapter 5)
1a*	ORG (65%)	ADMIN (60%)	ADMIN (80%)
1b*	JOINT (45%)	JOINT (100%)	CONTR (60%)
1c**	JOINT (40%)	JOINT/ORG (40%)	JOINT/ORG/LEG (40%)
2a**	FLEX (90%)	FLEX (100%)	FLEX (80%)
2b**	ORG (75%)	ORG (80%)	ORG/COLLAB (60%)
2c**	DOD (70%)	DOD (100%)	DOD (40%)
3a**	NEG (75%)	NEG (80%)	NEG (100%)
3b*	CUL (40%)	NEG (60%)	NEG (60%)
3c**	CUL (70%)	CUL (100%)	CUL (40%)
4a*	NEG (65%)	CUL (100%)	CUL (100%)
4b-c**	CUL (95%)	CUL (60%)	CUL (60%)
5a**	LDR (55%)	LDR/TRNG (60%)	LDR (60%)
5b*	LDR (95%)	LDR (60%)	TRNG (60%)
5c*	LDR (75%)	EMPTY (100%)	EMPTY/TRNG (40%)

Sources: Appendices AA and CC.

* 2 of 3 emergent sub-codes match across the organization interviews and the OT case studies.

** 3 of 3 emergent sub-codes match across the organization interviews and the OT case studies.

Note: Emergent sub-codes are defined in Appendix Z.

As the Table above shows, over half (8 of 14) of the interview questions have the same most frequently coded emergent sub-code. The remaining questions (6 of 14) interview questions have two of three same most frequently used emergent sub-codes. The Table also shows that the percentage of participants that make responses with these most frequently used codes are quite high. For example, for Interview Question 2a: 18 of 20 (80%) of the organization participants, 5 of 5 (100%) of the RSGS OT case study participants, and 4 of 5 (80%) of the Living Foundries OT case study participants gave responses that are most frequently coded with the FLEX emergent sub-code. The researcher believed that the Table above demonstrates that the majority of participants frequently make the same or very similar responses to all the interview questions. Moreover, their most frequent responses are substantially the same across three different sets of study participants. This additional convergent data the researcher bolstered the researcher's confidence that the frequency method is a reliable analysis method to use for the study.

Finally, the researcher is confident that the frequency method is reliable because of his familiarity with the data. The interview process, and subsequent review and coding of the interview transcripts, demanded that the researcher become immersed in the data. The researcher spent about a year reviewing and analyzing the data. As a result, the researcher gained a good sense of the most significant remarks the participants made in response to each interview question. Based on his familiarity with the data, the researcher finds that the frequency method helped to derive major findings for the interview questions that accurately reflected what the participants said, and what they meant, during their interviews.

For instance, in Table 18 above, based on his familiarity with the data, the researcher knows that NEG-coded interview data is the most frequently coded data for Interview Question 3a (What are the disadvantages of using OTs compared to TPAs such as contracts, grants, and cooperative agreements?). And based on his familiarity with the data, the researcher knows that CUL-coded data is the most frequently coded data for interview question 3c (How do disadvantages of OTs contribute to the lesser use of OTs in other DoD organizations?). These responses are analyzed and contributed to the major findings for those questions.

Thus, looking at the data holistically—namely, across all interview questions and participants—and based on being immersed in the data for an extended period, the researcher is reasonably confident that the frequency of response method helps derive significant and major findings that reliably represented what the participants, in aggregate, meant in response to the interview questions. Therefore, the frequency method is reliable because the major findings reflect the researcher’s familiarity with the data and his understanding of what the participants meant in their responses to the interview questions.

Interpretation and Synthesis of Major Findings

The purpose of interpreting and synthesizing the findings is to produce reliable, dependable and credible study findings and conclusions derived from the organization interviews (Chapter 4) and the OT case studies (Chapter 5). As discussed in Chapter 6, the answer to the research question is a narrative version of the consolidated major findings from Chapters 4 and 5. Interpretation and synthesis of the consolidated major findings is meant to add another layer of understanding to support the study conclusions and recommendations.

Bloomberg (2012) distinguishes between analysis, interpretation, and synthesis of data. In simple terms, data analysis takes data apart while interpretation and synthesis are the process of putting data back together. Interpretation also includes how the major findings from the interviews are supported by all other data collection methods, how major findings relate to the prior literature, and how findings relate to the researcher's prior assumptions about the study.

Interview data are analyzed to derive the major findings presented in Chapter 4 and Chapter 5. Interview data and the prior literature are interpreted and synthesized to arrive at conclusions and recommendations presented in Chapter 7. The conceptual framework, the coding scheme, and the findings roadmaps are tools used to help in analyzing, interpreting and synthesizing the study data. The process of interpreting and synthesizing the findings starts with preparing consolidated major findings. Chapter 6 discusses this process. Following successfully triangulating the major findings from Chapter 4 and Chapter 5, the major findings from organization interviews and the OT case studies are combined to derive a set of consolidated major findings that best reflects the overall data.

The consolidated major findings align with the interview questions and conceptual framework categories and, in aggregate, provide the participants' answer to the research question. Chapter 6 provides a narrative version of the consolidated major findings as an answer to the research question. The researcher, however, wants to seek a more in-depth understanding of the study data. Thus, the researcher seeks to further organize the consolidated major findings glean deeper insights into what they meant. Organizing starts with pairing the major findings across the conceptual framework categories. This is not a mechanical process. Instead, it requires the researcher to reflect on the findings and bring his own experience and opinions to bear to aid the interpretive process. As discussed in Chapter 4 and Chapter 5, the study made

numerous major findings. Chapter 6 consolidates all the major findings. The following Table summarizes the study's consolidated major findings organized by interview question and conceptual framework category.

Table 19. Consolidated Major Findings

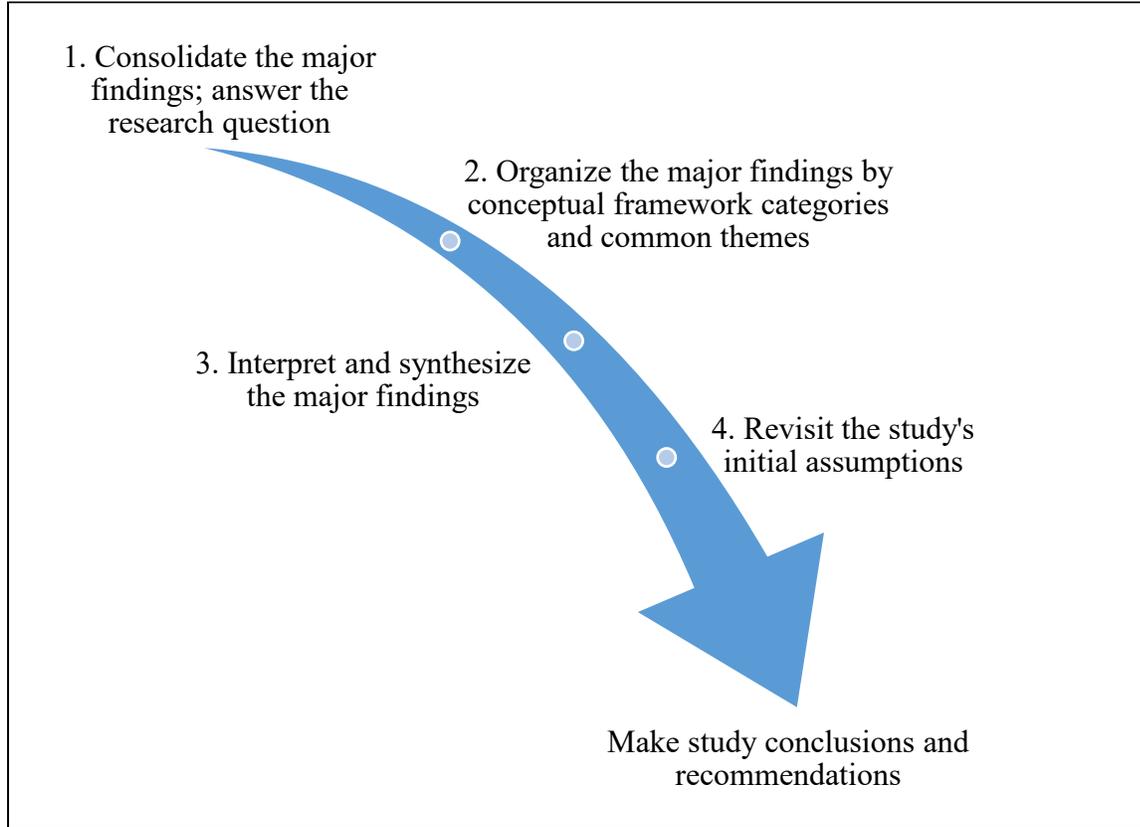
Interview Question/ Conceptual Framework Category	Consolidated Major Findings
1/ OT Award	DoD organizations select OTs instead of TPAs to help field advanced technology capabilities and to work with nontraditional contractors. OTs offer flexible terms and conditions, for instance, the government can accept funding from the contractor. Successful OT negotiations depend on the parties' prior experience with OTs, mutual trust, open communications, flexibility, and understanding each other's legal and business needs.
2/ OT Advantages Versus TPAs	OTs offer simpler and more flexible terms and conditions than TPAs, for instance, changing an OT is easier, and the government can accept funding and in-kind contributions from the OT contractor. Fewer rules and regulations apply to OT than TPAs. OTs improve communication and collaboration between the parties. OTs impact the ability of organizations to attract advanced technology contractors, enabling new technology solutions for mission needs.
3/ OT Disadvantages Versus TPAs	Some employees resist change (OTs) because they fear losing control of procurement processes and turf. It is uncertain what OT terms and conditions are mandatory versus negotiable. OTs take longer to negotiate than TPAs because most terms are negotiable. OTs changes during OT administration are time-consuming. Lack of OT expertise discourages employees from trying OTs. DoD's risk-intolerant culture discourages employees from using OTs and punishes any OT failure. DCMA is unfamiliar with OTs, impeding the wider use of OTs. The Army's failed FCS program continues to impact the wider use of OTs by DoD.

4/ Number of OTs Versus TPAs	TPAs are appropriate for most DoD requirements. OT advantages such as speed to award impact the numbers of OTs. Employee workload impacts the numbers of OTs. Organizations with R&D missions have more OTs than TPAs. There is insufficient DoD leadership support for OTs. There is a lack of training and policy guidance for OTs. The resources and creativity needed to negotiate OTs cause more TPAs. Employees are used to relying on familiar procurement regulations and policies. Employees are risk-averse to try new procurement processes such as OTs.
5/ What can be Changed	Organizational inertia, employee habit, and risk aversion impact use of OTs. Leadership must actively and publicly support OTs. More OT policy guidance, OT templates, and knowledge management tools will help employees use OTs. Employees should be delegated more authority and independence to use OTs. Employees should not suffer adverse career consequences just because an OT fails. Adopting OT best practices from other federal agencies will help DoD to use OTs. Providing training information to nontraditional contractors will make them more willing to use OTs. Providing more resources to DoD contracting agents will make them more willing to use OTs.

Sources: Chapters 4, 5, and 6.

Chapter 6 presents the answer to the research question using a narrative format of the consolidated major findings summarized in the Table above. The consolidated major findings are interpreted and synthesized using the four-step process illustrated in the following Figure.

Figure 11. Process for Interpretation and Synthesis of the Consolidated Major Findings



Sources: Process adapted from Bloomberg (2012) and Creswell (2014).

As illustrated in the Figure above, in the first step, the researcher prepares consolidated major findings. The consolidated major findings are derived from the major findings from Chapter 4 and Chapter 5. The process for how this is done is discussed in Chapter 6.

In the second step of Figure 11 above, the researcher organizes the major findings by common themes. Using the conceptual framework as a guide, the researcher compares the major findings to look for findings that were similar. For example, the major findings that relate to OTs being more flexible than traditional procurement agreements are grouped under conceptual framework category two, OT Advantages Versus TPAs. All other findings are grouped in the same manner under proper conceptual framework categories. Next in the second step, the

researcher further organizes the major findings into themes within the conceptual framework category. For example, major findings related to OT disadvantages are organized under the OT disadvantages conceptual framework category. The researcher compares these findings to see if they could be organized by themes. As a result, the major findings for the OT disadvantages conceptual framework category are additionally organized under two themes, leadership and people. The researcher uses the same process to organize the remaining major findings by conceptual framework categories and themes.

In the third step of Figure 11 above, the researcher outlines potential interpretations of each of the consolidated major findings by brainstorming and using an inductive question-posing process consisting of why? /why not? Applying this dyadic questioning process, for each of the major findings, the researcher asks himself: Why was there this major finding? He then asks: Why not—namely, why should there have not been this major finding? The researcher repeats this question-posing process to help generate alternative interpretations of the major findings.

This iterative, inductive question-posing process comports with the study's pragmatist epistemological approach in Chapter 1. Consistent with pragmatism, it helps the researcher find and answer to the research question using all available approaches to answer the problem (Creswell, 2014). From a pragmatist perspective, the question-posing process provides the researcher with a practical tool for outlining all potential interpretations for each of the consolidated major findings. Iteratively asking why and why not about each consolidated major findings, and writing down potential answers in his field notes, also spurs the researcher to think about counterfactual explanations for the consolidated major findings. The researcher's interest in discerning counterfactual explanations for the consolidated major findings responds to the prior literature's observation of the importance of this analysis technique in historical

institutionalism studies (Capoccia, 2007; Fike, 2009). Chapter 6 discusses the interpretation outline tool that is developed to document the results of this question-posing process. Beyond responding to the prior literature, it is hoped that the interpretation outline tool will help make the study findings more reliable.

Chapter 6 discusses the results of the why? /why not? interpretation process that came from iterating the process using the study's consolidated major findings. The result of the process is an interpretation outline tool that documents potential alternative explanations for each of the major findings. The tool also includes citations to the prior literature useful for interpretation of the findings. Appendix II provides the interpretation outline tool.

The researcher uses the interpretation outline tool to interpret the consolidated major findings. The interpretation process proceeds by analytical framework category and theme. To aid interpretation, the researcher refers to the findings roadmaps discussed in Chapters 4 and 5 and provided in Appendices BB, DD, and EE. Using these tools, for the major findings grouped under a theme, the researcher tries to synthesize the prior literature, direct quotations from the study participants, and to apply the researcher's professional knowledge, to extract deeper meanings from the study data.

Chapter 2 discussed the two literature topics for the study—OTs and historical institutionalism. Based on the prior literature, historical institutionalism is the theoretical lens for the study. During interpretation of the consolidated major findings, the researcher tries to apply this literature to figure whether the findings confirm what is already known about the research question or depart from it. The study's research hypothesis discussed in Chapter 1 posits that change is occurring at some DoD organizations and this will eventually lead to wider use of OTs across DoD. Therefore, the researcher tries to relate interpretations of the study

findings to the endogenous institutional change literature discussed in the historical institutionalism literature topic in Chapter 2.

The researcher tries to keep the interpretation tight and focused on providing reliable and trustworthy study conclusions and recommendations. Thus, while the major findings are broad, interpretation of the findings only includes information the researcher feels was necessary to understand what the finding means. The researcher uses his professional experience and intuition to aid in understanding the findings. He also draws upon the prior literature to explain patterns and themes. By making connections between the study findings and the prior literature, the researcher tries to integrate these findings into the prior literature and discern how the study could make new contributions to the literature.

Thus, in the third step of Figure 11 above, the researcher tries to apply his professional experience and intuition to interpret the findings and to leverage the teachings of the prior literature to strengthen interpretations of the consolidated major findings. The primary goal of the third step of the interpretive process is to gain greater insight into the major findings, helping the researcher synthesize and communicate what the data showed given the purposes of the study discussed in Chapter 1. The researcher tries to be attentive to areas where the study findings contradicted or went beyond the prior literature since these were areas where new lessons could be learned that might be helpful to the DoD OT program or might add to the prior literature. For example, the study's findings indicate that OTs take longer to negotiate than traditional procurement agreements, which is contrary to the OT literature (GAO, 2000; Dunn, 2017). Chapter 6 provides the interpretation of the study's consolidated major findings.

As part of the interpretation and synthesis process, in the fourth step of the Figure 11 above, the researcher revisits the study's initial assumptions presented in Chapter 1. The purpose

for this is to evaluate the initial assumptions given what is learned in the study. Based on what is learned in the study, the researcher determines whether each initial assumption held true. Again, the researcher searches for rival or competing explanations and interpretations of the data. The researcher is vigilant to consider other logical possibilities for the findings or interpretation and to investigate whether these rival explanations could be supported by the findings or the literature. Rival explanations for the study's consolidated major findings are discussed in Chapter 6 as part of the interpretation discussion. Thus, revisiting the study's initial assumptions provides the researcher with another opportunity to reflect on the meaning and significance of the study data. Chapter 6 discusses the results of revisiting the study's initial assumptions.

This interpretation process described above—preparing consolidated major findings, organizing major findings by themes, and interpreting the major findings—culminates in synthesis of the consolidated major findings. Synthesis is the process of pulling everything together (Bloomberg, 2012). To do this, the researcher uses the concepts of historical institutionalism as a theoretical lens and discussion framework. The purpose of this approach is to consider whether the concepts of historical institutionalism apply to the consolidated major findings, and, by inference, to the DoD OT program. This approach enables the researcher to consider whether the concepts of historical institutionalism offer insights on the research hypothesis. Using the consolidated major findings, the researcher tries to assess whether the concepts of historical institutionalism—for instance, path dependence and endogenous change—apply to the DoD OT program.

As mentioned previously, the study does not assume that the DoD OT program reflects the concepts of historical institutionalism. Instead, the study approaches data collection and analysis with no preconceived determination whether this prior literature topic applies to the

DoD OT program. During synthesis, the researcher applies the concepts of historical institutionalism, and his perspectives on what is learned from the study, to the consolidated major findings. Among other things, the goal of this is to consider whether the concepts of historical institutionalism apply to the DoD OT program, and by extension, also reflect on the research hypothesis. Synthesis seems like the appropriate place in the study to reflect on the concepts of historical institutionalism because by this stage, all data has been collected and interpreted, and consequently the researcher had an improved sense of what the data meant.

As part of the synthesis discussion, the researcher revisits the study's initial assumptions. Revisiting the initial assumptions helps the synthesis process by requiring the researcher to go back and reflect on the assumptions in view of data collected during the study. It also helps the researcher to consider what is learned in the study. Revisiting the initial assumptions is labelled as step four in the Figure 11 above but is included as part of the synthesis discussion in Chapter 6. Chapter 6 discusses the synthesis process, including discussing the consolidated major findings in view of the concepts of historical institutionalism and the researcher's perspectives. Each of the study's eight initial assumptions are revisited to assess whether they turned out to be true in light of what has been learned in the study.

Conclusions and Recommendations

Chapter 7 provides the study's conclusions and recommendations. The conclusions and recommendations are all traceable to the consolidated major findings, as documented by the conclusions and recommendations consistency table provided in Appendix JJ and discussed in Chapter 7. The study makes seven conclusions, including a conclusion about future research of

the DoD OT program. Following the conclusions, the study makes six policy recommendations, and a recommendation for future research. The following is a brief summary of these seven conclusions and related recommendations taken from Chapter 7 and provided in Appendix JJ.

- Conclusion: DoD organizations must provide employees and nontraditional contractors adequate OT education and training resources to support the wider use of OTs. Providing such education and training will encourage more nontraditional contractors to propose to DoD OT funding opportunities and will speed up OT negotiations with these contractors.
 - Recommendation: Establish a knowledge management resources website for OTs. The site should be publicly accessible by DoD employees and by contractors. The website could be managed by a DoD organization such as DAU or by a contractor, for instance, a consortium OT management firm or by a Federally Funded Research and Development Center (FFRDC).
- Conclusion: DoD employees and contractors lack policy guidance and knowledge management tools—OT checklists and OT templates—to help them more widely use OTs.
 - Recommendation: Provide policy guidance and knowledge management tools to employees and contractors—including OT checklists and OT templates—as part of the DoD knowledge management resources website for OTs.
- Conclusion: If DoD organizations were required to use FPDS to record all unclassified OT awards, DoD could use the data develop reliable quantitative metrics for assessing and measuring the success of the DoD OT program. Using FPDS to record OT awards would provide DoD with data to respond to congressional requirements for reporting DoD OT statistics.

- Recommendation: Update existing (DFARS) regulations to make use of FPDS mandatory for recording unclassified OT awards, including OT projects awarded under consortium OTs. FPDS data should be used to develop quantitative metrics for assessing the success of the DoD OT program.
- Conclusion: DoD has insufficient policy guidance to show strong leadership support for OTs and to encourage the wider use of OTs. But leadership should be cautious about creating additional policy guidance to show its support for OTs.
 - Recommendation: Update procurement regulations, policies, and guidance to show strong leadership support for OTs. Updated policies should give DoD organizations and employees more independence and authority to use OTs. The updated policies should establish appropriate circumstances where there is a preference for using OTs.
- Conclusion: DoD has a shortage of experienced agreements officers to negotiate and award OTs. Even where experienced agreements officers are available, their workload for other projects may prevent them from doing OT work. Experienced program managers are critical to negotiating and administering OTs. OT training and experience is not currently part of the DoD core certification requirements for these categories of employees.
 - Recommendation: Update and expand existing DAU contracting officer and program management core certification standards to include OT training and experience requirements. Delegate OT authority to Level 3 certified program managers.
- Conclusion: DoD does not formally share OT best practices with other federal agencies to improve the DoD OT program.
 - Recommendation: Establish an interagency working group to share OT best practices with other federal agencies.

- Conclusion: Additional research of the DoD OT program may help DoD more widely use OTs. Causal Process Tracing (CPT) could be used in tandem with the consolidated potential causal mechanisms from this study to conduct such future research.
 - Recommendation: Conduct additional research of the DoD OT program using CPT and case studies.

Data Sources for Analysis, Interpretation, Synthesis, Conclusions, and Recommendations

The researcher uses several data sources to prepare the analysis and interpretation and synthesis sections presented in Chapter 6 and the conclusions and recommendations presented in Chapter 7. The following Table summarizes these data sources.

Table 20. Data Sources for the Study's Analysis, Interpretation and Synthesis, and Conclusions and Recommendations

Dissertation Section	Chapter	Data Sources
Analysis of the organization interview data	4	<ul style="list-style-type: none"> • Organization interview data—most frequently coded responses • Researcher's field notes
Analysis of the case studies interview data	5	<ul style="list-style-type: none"> • Case study interview data—most frequently coded responses • Researcher's field notes
Interpretation of the consolidated major findings*	6	<ul style="list-style-type: none"> • Interview data—all coded responses from Chapters 4 and 5

		<ul style="list-style-type: none"> • Prior literature topics from Chapter 2
Synthesis of the consolidated major findings	6	<ul style="list-style-type: none"> • Concepts of historical institutionalism • Researcher's professional perspectives
Conclusions	7	<ul style="list-style-type: none"> • Consolidated major findings from Chapter 6 • Prior literature topics from Chapter 2 • Researcher's perspectives • Causal process tracing literature from Chapter 7 • Most recent news media
Recommendations	7	<ul style="list-style-type: none"> • Conclusions

Source: Author.

* The consolidated major findings are derived from the major findings of Chapters 4 and 5.

As the Table above shows, the researcher uses interview data for analyzing the organization interview data and case study interview data. To reduce the potential for bias, the researcher does not add his professional perspectives to the analysis. The prior literature is not used for analysis of the interview data. In this manner, the major findings are derived objectively, using only the participants' (most frequent) responses to the interview questions. This approach ensures that the major findings are based on what the study participants said in response to the interview questions; not what the researcher's interpretation of what the participants said or how the prior literature might bear on the analysis process.

The Table 20 also shows that for interpretation of the consolidated major findings—which represents the aggregated major findings from Chapters 4 and 5—the researcher relies on all coded interview data. Thus, for interpreting the consolidated major findings, the researcher does not just use most frequently coded interview data, but instead drew on all coded interview data. To aid interpretation, the researcher also selectively draws on literature from the two literature topics. Thus, interpretation of the consolidated major findings uses illustrative direct quotes from all coded interview data and teachings from the prior literature to help understand what the consolidated major findings mean.

Table 20 above shows that for synthesizing the consolidated major findings, the researcher used concepts of historical institutionalism and his professional perspectives. Initially, the study did not assume that concepts of historical institutionalism apply to the DoD OT program. But synthesis seems the proper time to reconsider this assumption, since by the synthesis stage in the study all interview data had been collected, analyzed, and interpreted. The researcher had spent almost a year working with the data and had gained an improved sense of its meaning. Thus, the researcher believes that the synthesis section is the proper section to add his professional perspectives to the overall interpretation of the study's major findings. In this manner, the researcher hopes to minimize introducing personal bias into the study's conclusion and recommendations.

Table 20 above also shows that the study conclusions are based on the consolidated major findings, supplemented as appropriate by literature from the literature topics and the latest news media stories about the DoD OT program. The researcher's perspectives are important in selecting which of the consolidated major findings should support study conclusions. Since one of the conclusions discusses CPT, that conclusion also draws on the CPT literature. The study's

recommendations are based on the conclusions. In this manner, the study's recommendations can be traced back to corresponding conclusions, which, in turn, are traceable back to the consolidated major findings. Since the consolidated major findings are based on the interview data, the conclusions and recommendations that were prepared using these findings can be reliably traced back to what the participants said in response to the interview questions.

Therefore, the researcher carefully selects the data sources in the Table above to make sure that the major findings are based on what the participants said, not the researcher's perspectives or the literature topics. The prior literature and the researcher's perspective are applied to the consolidated major findings during the interpretation and synthesis to help glean additional meaning from the consolidated major findings. The conclusions and recommendations are traceable back to the consolidated major findings, which in turn are based on the participants' interview remarks.

Ethical Considerations

The researcher is involved in the DoD OT program and conducted the study in a research setting and with participants that the researcher knows. Creswell (2014) refers to this as backyard research. Since the study can be characterized as backyard research, the researcher is sensitive to potential biases this could introduce in the data analysis, findings and interpretation and synthesis processes outlined above.

Ethical considerations are discussed in Chapter 1, including the steps the researcher took to address potential ethical issues. To recap here, the researcher ensured informed consent of the participants. Beyond requiring participants to sign the Virginia Tech IRB informed consent form

before taking part in the study, the researcher also made sure that the participants understood the purposes of the study. Most participants were curious about the study, including about its scope and research methods. The researcher dedicated time to explain the study to any participant that asked about it. This helped make sure that the participants gave informed consent before taking part in the study. An unexpected benefit of this added effort was that it resulted in the participants being more willing to help the researcher in identifying potential case studies and other participants. Also, participants made suggestions that improved the study. For instance, several participants recommended additional literature that proved to be helpful for the researcher to review.

The researcher made sure that participant data remained confidential. To ensure confidentiality, study data, for instance, interview transcripts, is stored on an encrypted and fire walled computer drive. The researcher redacted private and personal data from interview transcripts. Thus, no private data is used in the study. The researcher does not store significant amounts of participant data in hard copy format. Most hard copy data is scanned to electronic data or securely stored on the researcher's personal computer.

To maintain data accuracy, the researcher provided each participant with their interview transcript and invited them to review it for accuracy and content. The researcher encouraged the participants to edit their transcript as they deemed necessary. Most participants made minor edits to their transcripts. Not only was this process attentive to research ethics, but it had the collateral benefit of improving the accuracy of the interview transcripts. Participants corrected errors in the transcripts that the researcher otherwise might have missed.

The study pays close attention to avoiding plagiarism. All research source material used in the study are cited following the APA publication and Virginia Tech ETD guidelines (APA,

2010; Virginia Tech, 2017). The researcher used a commercial plagiarism software programs, Grammarly and ProWritingAid, to make sure the study properly cited all research source materials. To verify its originality, the draft dissertation was also reviewed using Virginia Tech's iThenticate software.

Reliability, Credibility, and Dependability

The researcher took steps to enhance the reliability, credibility, and dependability of the study. Leech (2007) discusses improving the reliability of a qualitative study by using two or more data analysis methods (Leech & Onwuegbuzie, 2007). By doing so, a researcher can improve data representation, meaning helping improve meaning extracted. The study uses two data analysis methods, coding and content analysis. First, data are coded to find themes to support the study findings. Second, basic content analysis is used to figure the frequency of typical responses by participants to the interview questions. This helps find the themes that were most important to the participants. Discrepant or negative findings are analyzed using the interpretation outline tool during interpretation and synthesis of the major findings to find potential discrepant findings that might run counter to what appeared to be clear findings. Thus, two data analysis methods—coding and content analysis—enhance the study's reliability.

Credibility of a study hinges on whether the participants' perceptions align with the researcher's version of their perceptions (Bloomberg, 2012; Graneheim, 2003). Researcher bias is a primary determinant of credibility. To reduce the potential for researcher bias, the study sought out participants with a broad range of experience and backgrounds. The study relied on the participants to find potential OT case studies. Study participants were given the opportunity

to review and edit their interview transcripts. The transcripts are analyzed by selecting the most frequently coded responses. Data analysis does not include the researcher's interpretation of the coded interview data. Using this approach, the researcher is able to make findings that reflected what participants most frequently talked about during their interviews, not what the researcher thought they mostly talked about or believed was most important.

Dependability of a study refers to whether other researchers can understand and follow the procedures that a researcher uses to collect and interpret data for a qualitative study (Creswell, 2014). A dependable study includes a thorough audit trail comprising detailed explanations of processes used to collect and interpret data so that these processes become available for other researchers to use. To enhance dependability, the researcher tries to offer thick, rich descriptions of all phases of the study to make sure that anyone else that is interested in applying the study findings in another institutional setting will have a robust research framework for comparison. The researcher is attentive to providing a detailed account of the focus of the study, the researcher role, the bases for selecting participants and DoD organizations, and the processes used to collect, analyze, interpret, and synthesize data. The researcher often uses charts and tables in the dissertation to help give a precise and exact account what the study is about, how the study is conducted, and how its findings are developed. The dissertation is supported by appendices that give more information to enhance transferability.

Delimitations and Limitations

Study delimitations and limitations are introduced in Chapter 1. The study has several delimitations and limitations. A delimitation refers to boundaries set to frame the study to be

most likely to produce useful study results (Bloomberg, 2012). Delimitations can include selected aspects of the problem, time, and location of the study sample chosen and so forth. The researcher, however, sets the delimitations for a study.

There are several delimitations to the study. For instance, the study is delimited to gathering data from DoD organizations and just a few contractor organizations. Although the researcher interviewed contractors, for example, contractors that manage DoD OT consortiums and OT contractors for the case studies, the study is mostly targeted at DoD organizations. This delimitation is based on the research question, which focuses on DoD organizations. The purpose of this delimiting condition is to focus on investigating institutional factors that have influenced OTs within DoD. The researcher believes the best way to examine these factors is to concentrate on interviewing participants that are currently involved in the DoD OT program.

A noteworthy delimitation of the study is that it is limited to OTs for prototypes under 10 U.S.C. § 2371b. As discussed in Chapter 1, ten other federal agencies have OT authority. As shown in Appendix C, OT authority is circumscribed by each federal agency's particular OT statute. And only one of these organizations, DHS, has been delegated OT prototype authority that is similar to DoD OT authority (GAO-16-209, 2016). The remaining nine federal agencies such as NASA, the TSA, and DOE have OT authority of varying scope and purposes. Since it is apparent that each federal agency's OT statute is unique, with different delegated authorities and restrictions, the study is limited to OT for prototypes authority under the DoD OT statute.

Another delimitation is the OT case studies. As discussed in the OT case studies section above, the researcher selected two OT case studies to use as quasi-experiments to triangulate the findings from the organization interviews. The first case study involves a traditional contractor, and the second case study involved two nontraditional contractors. The case studies are for

ongoing OTs at DARPA. But the participants identified various other OTs as potential candidates for the case studies. The OT literature identifies other OTs that could have been case studies. Further, FPDS records over 100 other OTs that could have been case studies. So, a limitation of the study is that it only conducts two case studies and those case studies are both for DARPA OTs. Conducting more case studies or broadening the case studies could have enhanced the trustworthiness of the study findings. Thus, the sample of OT case studies is a study delimitation.

An additional study delimitation is that it focused on OTs that are ongoing and that have been recently awarded. The participants mostly talked about OTs that they have experience with, and generally these OTs were recently awarded or completed in the recent past. But there are notable past OTs that could be valuable to study. For instance, the Army's FCS OT is considered a famous OT failure (Project on Government Oversight (POGO), 2017). The Air Force, Navy, and DARPA have conducted several high visibility OTs in the past. For example, DARPA developed the first military combat UAV, now known as the Global Hawk, under an OT (Sommer, United, & National, 1997). The Air Force's satellite program is managed by a contractor that purchases rocket engines under a series of OTs (GAO-15-623, 2015). In the late 1990s, the Navy tried to build an arsenal ship using an OT (Dunn, 2009). These OTs might have made useful added useful studies for the study. But the study is limited to two case studies of ongoing OTs to help collection of relevant data and access to participants. This purposeful choice is made to select OTs that could be quasi-experiments, with the idea that if the quasi-experiments proved useful, more case studies could be added to improve the reliability of the study findings. Chapter 7 explores how additional case studies could be studied in future research of the DoD OT program.

According to Bloomberg, limitations are conditions that may weaken the trustworthiness of study. Sample size and researcher bias are common limitations in qualitative studies. Both of these limitations apply to the study. For instance, the sample size is a limitation. The researcher interviewed 20 organization participants and ten participants for the case studies, with only one participant interviewed at most of the organizations. The researcher does not conduct participant interviews at other organizations involved in the DoD OT program.

The study partly relies on the snowball technique to find participants for the study, meaning that the researcher relies on participants to identify other potential participants. Thus, the study relies on the participants to find other personnel that may have been willing to take part in the study. Accordingly, the sample size and research locations are limited compared to the overall size of DoD. The participants identified people they knew as potential other participants, at organizations they were familiar with, and this may skew the research sample towards a subset of the DoD OT workforce.

Researcher bias is a study limitation. As discussed in Chapter 1 and above in the context of data analysis, the researcher is involved in the DoD OT at DARPA. DARPA is a leader in the DoD OT program. Thus, the researcher brings to the study several years of professional experience at a DoD organization that negotiates and administers OTs. The researcher has a role in this process. The researcher understands that the same professional experience that helps in providing research insights during the study acts as a liability, potentially biasing his judgment on how the study was conducted and in analyzing and interpreting its findings. As discussed earlier in this chapter, this limitation chiefly accounts for the researcher using the frequency method for analyzing the coded data. It also accounts for the researcher selecting OT case studies based on OTs identified by the study participants.

Chapter 4–Organization Interview Findings

Introduction

This chapter provides the findings for the organization interviews. The purpose of the study is to investigate institutional factors that may have affected how widely DoD organizations have used OTs. Although Congress has amended the OT statute to encourage wider use OTs, DoD has continued to use OTs sparingly. Thus, the study’s research question is: Why, despite their reported administrative advantages, are OTs only sparingly used by DoD compared to more administratively burdensome traditional procurement agreements?

But despite historical resistance to OTs, there seems to be a growing awareness and use of OTs by DoD organizations. Thus, the research hypothesis is: Although Congress has amended the OT statute to encourage wider use OTs, DoD has continued to use OTs sparingly. Based on the researcher's professional experience, institutional resistance to using OTs can be traced to path dependence and positive feedback mechanisms such as low leadership support and employee risk aversion and habit. The numbers and variety of OTs at some DoD organizations, however, indicate that institutional change is occurring, and this may lead to a critical juncture or policy tipping point, resulting in wider use of OTs across DoD.

To answer the research questions and investigate the research hypothesis, the researcher conducted qualitative interviews of participants at DoD organizations identified by the researcher or recommend by the participants. This chapter focuses on presenting the findings from participant interviews at these DoD organizations. Two of the organizations are DoD OT consortiums. Since these consortiums support the DoD mission, they are considered DoD

organizations for study purposes. As mentioned, the research also conducted two cases studies of ongoing OTs, which are presented in Chapter 5.

This chapter begins by providing an overview of how the conceptual framework and predetermined coding scheme is used to develop emergent sub-codes. Thus, this discussion builds on the discussion of the coding scheme in Chapter 3. The emergent sub-codes helped the researcher to organize the interview data in a manner that more accurately reflects participant remarks. Together, the predetermined and emergent sub-codes are used to analyze the interview transcripts. The analysis leads to the significant and major findings presented in this chapter.

This chapter also includes an overview of the steps for how the study's qualitative data analysis software—MaxQDA—is used to help data analysis. The rationale for using this software program is summarized. The chapter reviews the organizational settings for the DoD organizations where the participants work. Next, the chapter outlines how the findings for the DoD organization interviews are presented and how this relates to the study's conceptual framework. The chapter then summarizes the major findings for the DoD organization interviews. The rest of the chapter focuses on presenting the participants' perspectives related to each of the major findings, including perspectives related to significant findings that supported the major findings.

Organizational Settings

As discussed in Chapter 3, the researcher interviewed participants at a range of DoD organizations and from two consortium OT organizations. The researcher used data from FPDS and tips and suggestions provided by participants to collect a sample of participants from a

representative cross-section of DoD organizations currently involved in the DoD OT program. Some of these DoD organizations—for instance, DARPA and the Army’s Picatinny Arsenal—have awarded and administered hundreds of OTs. Due to their extensive experience with OTs, these organizations are considered centers of excellence in the DoD OT program. Other organizations—for example, SPAWAR and AFRL—have nascent OT programs that are awarding their first OTs. DIUx and SCO are recently established DoD organizations. But both of these organizations have embraced OTs as a more effective way to attract nontraditional contractors to partner with them to develop defense technologies. Several other DoD organizations—for instance TARDEC and DTRA—leverage consortium OTs to support their OT program. Thus, the participant organizations represented a range of OT experience and organizational histories. Appendix P provides summaries of the participant DoD organizations.

Study participants varied in age and work experience. But all are involved in the DoD OT program. Thus, the research sample is drawn from the population of DoD and OT consortium personnel that are supporting the DoD OT program. As discussed in Chapter 3, participants' relevant work experience range from two to 39 years and their specific experience on OTs ranged from zero to 125 OTs. A majority (22 of 30) of the organization participants (this chapter) and case study participants (Chapter 5), however, have worked on ten or less OTs. Participants are divided roughly equally between male and female and ranged from 31 years old greater than 50 years old. Thus, the participants represent a reasonable demographic cross section of career and OT experience. The following Table summarizes the participants by where they worked (participant organization) and interview type. The participant identifier is used to indicate the source of the participant quotations in the discussion of the interview findings that follow later in this chapter.

Table 21. Participant Organizations and Interview Types

Participant	Identifier	Organization	Interview Type
1*	DARPA1	Defense Advanced Research Projects Agency	In-person
2*	DARPA2	Defense Advanced Research Projects Agency	In-person
3	AFRL	Air Force Research Laboratory	In-person
4	DARPA3	Defense Advanced Research Projects Agency	In-person
5	DARPA4	Defense Advanced Research Projects Agency	In-person
6	DIUX	Defense Innovation Unit Experimental	Telephonic
7	AFHQ	Secretary of the Air Force (Pentagon)	Telephonic
8	OSD	Office of the Secretary of Defense (Pentagon)	Telephonic
9	SPAWAR	Space and Naval Warfare Systems Command	Telephonic
10	PIC	Army Contracting Command, Picatinny Arsenal	Telephonic
11	NSC	National Spectrum Consortium	Telephonic
12	DTRA	Defense Threat Reduction Agency	Telephonic
13	NAVYHQ	Secretary of the Navy (Pentagon)	Telephonic
14	DOTC	Defense Ordnance Technology Consortium	Telephonic
15	TARDEC	Tank Automotive Research Development Center	Telephonic
16	MDA	Missile Defense Agency	Telephonic
17	SCO	Strategic Capabilities Office	In-person
18	PEO-CBD	Program Executive Office – Chemical, Biological Defense	Telephonic
19	SOCOM	U.S. Special Operations Command	Telephonic
20	DPAP	Defense Procurement and Policy (Pentagon)	Telephonic

Source: Author.

* Pilot interview.

The two pilot interviews were conducted in January 2017 for purposes discussed in Chapter 3. The remainder of the organization interviews were conducted between May and November 2017. These interviews follow the Virginia Tech IRB informed consent requirements. Interviews ranged from 30 minutes to 1½ hours, depending on how much information the participants wanted to offer.

Conceptual Framework and MaxQDA Software

Conceptual framework

The study uses two significant tools to organize and help analyze raw data collected during fieldwork—the conceptual framework and MaxQDA, a qualitative data analysis software program. The first tool used to help analyze the data is the conceptual framework. To recap discussion from Chapter 2, the conceptual framework is used to organize this data so that the researcher can make sense of it and thereby answer the research question. The conceptual framework is related to the interview questions and the coding scheme. The conceptual framework includes five conceptual framework categories, one corresponding to each of the study's five interview questions. It is based on the researcher's professional experience in the DoD OT program. It is informed by the review of the OT and historical institutionalism literature topics discussed.

The conceptual framework is used to develop the predetermined codes and predetermined sub-codes for the interviews. The conceptual framework is used in several other parts of the study's two-phase research design, including in interpretation and synthesis of the consolidated major findings. Chapter 6 discusses interpretation and synthesis. The following Table illustrates the relationship between the conceptual framework categories, the main interview questions and subsidiary questions, and the predetermined codes and predetermined sub-codes of the coding scheme.

Table 22. Conceptual Framework Categories, Interview Questions, and Predetermined Codes

Conceptual Framework Category	Interview Question: Subsidiary Questions	Predetermined Code and Predetermined Sub-Codes
1. OT Award	1: 1a 1b 1c	OT AWARD (Code): OT SELECTION (Sub-Code) NEGOTIATION SUCCESS (Sub-Code) NEGOTIATION FAILURE (Sub-Code)
2. OT Advantages versus Traditional Procurement Agreements (TPAs)	2: 2a 2b 2c	OT ADVANTAGES v. TPAs (Code): ADVANTAGES (Sub-Code) ADVANTAGES ORG. IMPACT (Sub-Code) ADVANTAGES DoD IMPACT (Sub-Code)
3. OT Disadvantages versus TPAs	3: 3a 3b 3c	OT DISADVANTAGES v. TPAs (Code): DISADVANTAGES (Sub-Code) DISADVANTAGES ORG IMPACT (Sub-Code) DISADVANTAGES DoD IMPACT (Sub-Code)
4. Numbers of OTs versus TPAs	4: 4a 4b	OT NUMBERS v. TPAs (Code): ORG FACTORS (Sub-Code) DoD-WIDE FACTORS (Sub-Code)
5. What can be Changed	5: 5a 5b 5c	WHAT CAN BE CHANGED (Code): ORG FACTORS (Sub-Code) DoD-WIDE FACTORS (Sub-Code) RESISTANCE TO CHANGE (Sub-Code)

Source: Author.

Building on the coding scheme development discussion in Chapter 3, the first step of data analysis process is to code the interview transcripts using the predetermined codes and sub-codes summarized in the Table above. As the Table shows, the predetermined codes are based on the category descriptions in the conceptual framework and follow the sub-descriptions of the conceptual framework.

Initial coding was flexible because the researcher expected that the codes would need to be changed as new information emerged from coding the data. As discussed below, this expectation held true and resulted in developing emergent sub-codes that were used to recode the interview transcripts to improve the reliability of the findings. Thus, interview data was coded twice—first with predetermined codes prepared using the researcher’s professional experience and the prior literature, and second with emergent sub-codes prepared after a review of the initial batch of interview transcripts.

MaxQDA

The second tool to analyze data is qualitative data analysis software. The researcher uses MaxQDA, a commercial qualitative data analysis software program, to help analyze the study data. The researcher selected MaxQDA over competing products because it has positive online reviews by student users and because the software’s online tutorials demonstrated that it is useful to help analyze study data. MaxQDA enables researchers to store and flexibly code and analyze interview transcripts using a variety of built-in software tools and graphics. The software is Mac-compatible and has affordable student license pricing. The researcher purchased a student license for MaxQDA.

MaxQDA is used to help develop the coding scheme, coding, and for organizing the study data, including the interview transcripts. It serves as a repository for interview transcripts, field notes, the coding scheme, the coding scheme descriptions, and PDF copies of prior literature and other qualitative data collected during the study. Thus, MaxQDA provides a valuable tool for saving, retrieving, coding, and organizing all interview data collected during the

study. MaxQDA data are stored in a secure folder on the researcher's password-protected computer. Therefore, the conceptual framework and MaxQDA are the two significant tools that the researcher used to organize and help analyze raw data collected during fieldwork.

Emergent Sub-Codes

As mentioned, the analysis process includes coding the interview transcripts twice. The data is coded twice to improve reliability. For both parts of this two-step coding process, MaxQDA is used to locate, code, save, and retrieve coded data. In the first step of the coding process, the researcher codes each of the participants' responses to the interview questions—as recorded in their interview transcripts—using the predetermined codes and predetermined sub-codes summarized in the Table 22 above. These predetermined codes were developed before the interviews and are based on the researcher's professional experience and the prior literature.

After coding the initial batch of interview transcripts with the predetermined codes, the researcher used the coded transcripts to develop emergent sub-codes related to each predetermined code. To do this, the researcher reviewed the predetermined coded segments for each interview question to find themes in the data. To find themes, the researcher prepared a one-line description of the gist of what each code segment appeared to be communicating. The researcher made a list of such one-line descriptions for each interview subsidiary question. The researcher then reviewed the list and organized the one-line description into groups representing similar themes. The researcher repeated this process until he grouped all the one-line descriptions into a handful of themes that encompassed the one-line descriptions. These themes are labeled with a descriptive name that became the emergent sub-code. Appendix Y provides

an example of the themes and corresponding emergent sub-codes that were developed for Interview Question 3 using this process. The following Table shows an extract of the emergent sub-codes that were identified for Interview Question 3 using this process.

Table 23. Predetermined Codes and Emergent Sub-Codes for Interview Question 3

<p>Interview Question 3: What do participants believe are the disadvantages of OTs compared to traditional procurement agreements?</p>
<p>Interview Question 3a: What are the disadvantages of using OTs compared to traditional procurement agreements such as contracts, grants, and cooperative agreements Conceptual Framework Category/Predetermined Code: OT DISADVANTAGES v. TPAs Predetermined Sub-code: OT DISADVANTAGES</p> <p>-----</p> <p>Emergent Sub-Codes: EXP–Organizational experience disadvantages of OTs compared to TPAs NEG–OT negotiation and administration disadvantages of OTs compared to TPAs CUL–Organization culture disadvantages of OTs compared to TPAs</p>
<p>Interview Question 3b: How do disadvantages of OTs impact use of OTs in your organization? Conceptual Framework Category/Predetermined Code: OT DISADVANTAGES v. TPAs Predetermined Sub-code: DISADVANTAGES IMPACT ON ORG.</p> <p>-----</p> <p>Emergent Sub-Codes: EXP–Organization experience impacts of OT disadvantages NEG–Organization negotiation and administration impacts of OT disadvantages CUL–Organizational culture impacts of OT disadvantages</p>
<p>Interview Question 3c: How do disadvantages of OTs impact use of OTs in other DoD organizations? Conceptual Framework Category/Predetermined Code: OT DISADVANTAGES v. TPAs Predetermined Sub-code: DISADVANTAGES IMPACT ON DoD</p> <p>-----</p> <p>Emergent Sub-Codes: EXP–OT disadvantages impacts on OT experience in other DoD organizations NEG–OT disadvantages impacts on OT negotiation and administration in other DoD organizations CUL–OT disadvantages impacts on culture in other DoD organizations</p>

Source: Appendix Z.

Appendix Z provides all predetermined codes, predetermined sub-codes and the emergent sub-codes for Interview Questions 1-5. Appendix X provides definitions for the predetermined codes and predetermined sub-codes. Appendix Z provides definitions for the emergent sub-codes. Thus, Appendix Z is the final coding scheme for the study and shows all predetermined and emergent codes that were developed using the two-step coding process discussed above.

In the second step of the coding process, the researcher used the emergent sub-codes to re-code all segments of the interview transcripts that were coded in the first step using predetermined codes. The second step of coding enabled the researcher to break the coded data into more manageable chunks, with the chunks of data from different respondent aggregated by theme. It enabled to better organize the data based on what the participants said during their interviews.

The second coding step also enabled the researcher to conduct a basic content analysis of the interview data. As discussed in Chapter 3, the researcher tabulates frequency of thematic responses by the participants. The response frequencies are provided in data summary tables for each interview sub-question and discussed below. The purpose of this basic content analysis process is to figure the most critical finding for each interview question according to the frequency of the finding being mentioned by the participants.

Because a large amount of data was collected from the interviews, this two-step content analysis process helps the researcher focus on presenting the most frequent themes discussed by the participants. The significant findings for the interview subsidiary questions are based on the most frequently discussed themes. Since the significant findings lead to the major findings for

the interview questions, content analysis play an important role in deriving the major findings discussed below. The rationale for using this frequency method for analyzing the interview data is discussed in Chapter 3.

How the Findings are Discussed

Below is a discussion of the interview findings with selected quotations from the organization interviews that help explain and support each finding. Major findings are summarized for each of the five interview questions. The major findings are supported by significant findings for each of the interview subsidiary questions corresponding to the related main interview question. The significant findings for the interview subsidiary questions are supported by a discussion of participant responses to the subsidiary question, organized by emergent sub-codes identified for the subsidiary question. In this manner, the researcher tries to develop a traceable record of how the major findings for the interview questions are each supported by significant findings for the corresponding subsidiary interview questions. Chapter 6 uses the major findings to derive consolidated major findings, and ultimately, in Chapter 7, to support study conclusions and recommendations. Thus, for study dependability purposes, it is important that a reliable record is developed that can be used to trace back from a study conclusion to significant findings based on participant remarks.

The discussion of the major findings for the interview questions, and the corresponding significant findings for the interview subsidiary questions, follows the organization of the conceptual framework and the coding scheme. As mentioned, the study conducted a basic content analysis of the interview data. For each interview sub-question, the frequency of

participant responses is tabulated by the percentage of participants that made remarks that were coded with each emergent sub-code identified for the subsidiary question. The content analysis is used to help figure the most significant findings for each interview subsidiary question, which contributed to determining the major findings for each of the five interview questions.

As discussed in Chapter 3, the findings for each interview subsidiary question are based on the frequency of how many participant remarks are coded with sub-codes identified for the subsidiary interview question. Thus, if 20 of 20 participants made interview remarks that are coded with an emergent sub-code, the frequency of responses for this emergent code is 100%. If two of 20 participants made remarks under an emergent sub-code, the frequency of responses is 10% and so forth. The descriptive language used to discuss these frequency ranges are:

- 100% = all
- 95% = overwhelming majority
- 75-90% = large majority
- 55-70% = majority
- 25-50% = some
- 5-20% = few

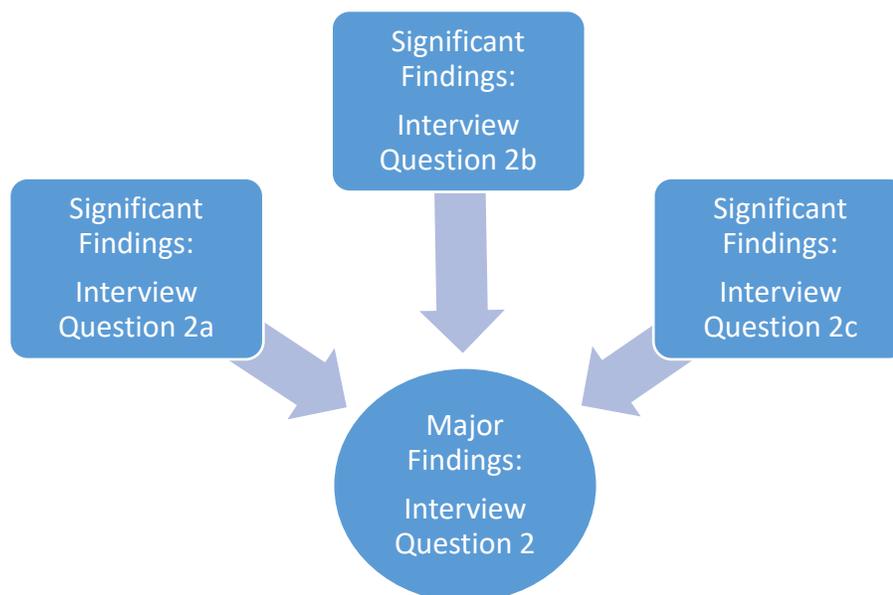
Appendix AA provides data summary tables for each of the five interview questions and their corresponding subsidiary questions. The tables present the frequency of participant responses to the relevant subsidiary interview question using the scheme described above. As discussed above and in Chapter 3, not all participant responses are discussed below due to the significant amount of data collected during the interviews. Instead, the discussion focuses on

discussing the most frequent participant responses to the interview questions. Frequency of response is determined using the content analysis method summarized above.

The discussion of findings below starts by summarizing all of the major findings the five main interview questions. Then, major findings are presented for each main interview question using the process outlined above. There are several major findings for each interview question. For each main interview question, significant findings are provided for each of its related subsidiary interview questions.

There are several significant findings for each subsidiary interview question. The significant findings for the subsidiary interview questions are used to derive the major findings for the corresponding main interview question. The following Figure illustrates how the significant findings are used to derive the major findings, here, for example, for Interview Question 2 (What do participants believe are the advantages of OTs compared to traditional procurement agreements?).

Figure 12. Example of How Significant Findings Are Used to Derive Major Findings



Source: Author.

As the Figure above shows, the significant findings for subsidiary Interview Question 2a, 2b, and 2c are logically combined to derive major findings for Interview Question 2. The discussion below reports the major findings for each main interview question, followed by the significant findings for each subsidiary interview question along with supporting quotes and discussion of the organization interviews. The significant findings are reported in narrative format, using extensive verbatim quotations from the participants to convey their perspectives and opinions. The goal of reporting the findings in this manner is to convey the richness and complexity of the participants' varying responses to the interview questions and to let the participants speak for themselves. A related goal is to present what the participants said as objectively as possible, without researcher bias or opinion.

The researcher's perspectives and the prior literature are not used to derive the significant findings and major findings presented in this chapter. Instead, the researcher's perspectives and the prior literature are used in the interpretation and synthesis sections in Chapter 6. This approach is adopted to mitigate researcher bias and to make sure that the major findings reflected the participants' responses to the interview questions. In other words, this approach is used to make sure that the major findings objectively reflect what the participants said, not what the researcher interprets them to say, or how the prior literature might bear on what the participants said. Therefore, study uses an objective approach to deriving the major findings and a subjective approach to interpreting and synthesizing the meanings of the major findings.

Findings Roadmap for the Organization Interviews

Bloomberg (2012) recommends outlining the findings using a roadmap. A roadmap is a tool that is constructed from the conceptual framework, the data summary tables and derived from the findings themselves. Thus, a findings roadmap summarizes all the study's major and significant findings. Appendix BB provides the findings roadmap for the organization participants' interviews. There are several practical purposes for preparing a findings roadmap for the organization interviews. First, the roadmap supplements the narrative discussion of the findings presented below and provides the reader with an outline of the major findings and significant findings. So, one practical reason for the findings roadmap is it enables the reader to see how the findings are related to each other.

Second, the roadmap provide the researcher with a tool to make sure that each of the major findings for the interview questions can be traced back to the significant findings for related subsidiary interview questions. This helps make the major findings more reliable and reduced the potential for researcher bias. Third, a findings roadmap is also prepared for each of the two case study findings in Chapter 5, and they serve the same purposes as the findings roadmap for this chapter. This enables the researcher to compare and contrast the findings between the organization interviews in this chapter and the OT case studies in Chapter 5.

Fourth, the findings roadmap for this chapter and Chapter 5 are used in Chapter 6 to aid in interpreting and synthesizing the findings. In particular, the findings roadmap are used in Chapter 6 to help the researcher discern potential relationships between the major findings and across different categories of the conceptual framework. The findings roadmaps are used to help

to interpret the major findings in view of the two literature topics—other transactions and historical institutionalism.

Fifth, the findings roadmaps are used to help derive the consolidated major findings. The consolidated major findings are the combination of the major findings from this chapter and Chapter 5 and thus represent the overall major findings for the study. The consolidated major findings are used in Chapter 6 to provide an answer the research question. The consolidated major findings are also used in Chapter 6 to organize the analysis and synthesis discussions.

Therefore, the findings roadmaps are meant to help the reader understand how the findings relate to each other. The roadmaps also provide the researcher with a tool to organize the findings, thereby improving the study's reliability. The roadmaps support the interpretation and synthesis sections in Chapter 6.

Summary of the Major Findings for the Organization Interviews

There are numerous major findings for the organization interviews, with several corresponding to each main interview question. The major findings are organized to follow the five conceptual framework categories. As mentioned, the major findings are derived from significant findings for corresponding subsidiary interview questions. Appendix E provides the subsidiary interview questions.

Thus, the first major findings are for Interview Question 1 and are based on the significant findings for each of the three subsidiary interview questions subsumed under Interview Question 1. The discussion below summarizes the major findings according to the related interview question and the significant findings according to related subsidiary interview

questions. As mentioned, major findings are derived from related significant findings for each interview question. The following Table summarizes the major findings for the organization interviews, cross-referenced to conceptual framework category, main interview question, and subsidiary interview questions.

Table 24. Summary of the Organization Interview Major Findings

Conceptual Framework Category	Interview Question: Subsidiary Interview Questions	Major Findings
1. OT Award	1: 1a 1b 1c	Organizations select OTs instead of traditional procurement agreements because OTs help them field new advanced technology capabilities and to do business with nontraditional contractors. The success of OT negotiations is influenced by joint factors such as the parties' prior experience with OTs, mutual trust and open communication, being flexible, and understanding the other party's legal and business needs.
2. OT Advantages versus Traditional Procurement Agreements (TPAs)	2: 2a 2b 2c	OTs offer more flexible terms and conditions than TPAs and improve communication and collaboration between the parties. OTs are enabling organizations to achieve new technology solutions for mission needs. The word is spreading across DoD organizations about the benefits of OTs. This knowledge diffusion has resulted in more DoD organizations using OTs. Cultural factors such as risk-aversion and entrenched bureaucracy, however, continue to oppose more significant impact of OTs in some DoD organizations.
3. OT Disadvantages versus TPAs	3: 3a 3b 3c	There is resistance to change [OTs] by contracting officers, program managers, and organization leadership. Procurement professionals and program managers fear losing control of procurement processes and giving up their turf. Some DoD organizations have rigid leadership that punishes

		procurement failures and mistakes. The audit-prone and risk-intolerant culture of DoD discourage DoD personnel from trying OTs. The stigma OTs got from the Army's failed FCS program continues to impact the use of OTs by DoD organizations.
4. Numbers of OTs versus TPAs	4: 4a 4b-c	Traditional procurement agreements are appropriate for most DoD requirements. OT advantages such as speed to award impact the numbers of OTs. OT disadvantages such as negotiation workload impact the numbers of OTs. DoD personnel are unfamiliar with OTs. They are risk-averse to try new procurement tools such as OTs. DoD personnel are used to relying on traditional procurement policies and regulations. There is a lack of training and policy guidance about OTs. There is little DoD leadership support for OTs.
5. What can be Changed	5: 5a 5b 5c	Institutional inertia, employee habit, and risk aversion cause DoD organizations and personnel to continue to rely on TPAs instead of OTs. Leadership must become more involved in supporting OTs and in encouraging DoD organizations to use OTs. Additional guidance, OT templates, sample clauses, and knowledge management tools must be provided to help DoD organizations and personnel more effectively use OTs. DoD organizations and personnel should be given additional authority, and independence to use OTs and not suffer adverse career consequences just because an OT fails.

Source: Organization interviews.

The discussion that follows reports the significant findings for the interview subsidiary questions in narrative format, using extensive verbatim quotations from the participants' responses to interview questions to convey their perspectives and opinions. The researcher uses what he learned from these participant perspectives and opinions to derive the major findings for the interview questions summarized in the Table above.

Major findings for interview question 1

Interview Question 1 is: What do participants believe are institutional and other factors that influence the decision to use an OT instead of a traditional procurement agreement?

Interview Question 1 includes three subsidiary interview questions:

- a) How does your organization determine to select an OT instead of a traditional procurement agreement such as a contract, grant, or cooperative agreement?
- b) If you select an OT, what factors can influence negotiations to succeed?
- c) If you select an OT, what factors can influence OT negotiations to fail?

The significant findings for Interview Questions 1a-c are:

- a) Organizations select OTs instead of traditional procurement agreements because OTs help the organizations field new capabilities and enable organizations to do business with nontraditional contractors. OTs are an emerging area of procurement at some organizations.
- b) Joint factors, including the amount of prior experience that parties have with OTs, mutual trust and open communications, being flexible, and understanding the other party's legal limitations or business needs can influence OT negotiations to succeed.
- c) Joint factors, including lack of trust between the parties, poor communications and the parties being inflexible with each other can cause OT negotiations to fail.

The significant findings for Interview Questions 1a-c lead to the following major findings for Interview Question 1:

Organizations select OTs instead of traditional procurement agreements because OTs help the organizations field new capabilities and to do business with nontraditional contractors. The success of OT negotiations is influenced by joint factors such as the parties' prior experience with OTs, mutual trust and open communication, being flexible, and understanding the other party's legal and business needs.

The following discussion summarizes significant findings for Interview Questions 1a-1c.

Significant findings for interview question 1a

Interview Question 1a is: How does your organization determine to select an OT instead of a traditional procurement agreement such as a contract, grant, or cooperative agreement? Of the 20 organization participants interviewed:

- 3 of 20 (15%) participants discussed administrative factors potentially impacting whether to select an OT instead of a traditional procurement agreement.
- 4 of 20 (20%) participants discussed contractor factors potentially impacting whether to select an OT instead of a traditional procurement agreement.
- 7 of 20 (35%) participants DoD-wide factors potentially impacting whether to select an OT instead of a traditional procurement agreement.

- 7 of 20 (35%) participants discussed legal and policy factors potentially impacting whether to select an OT instead of a traditional procurement agreement.
- 13 of 20 (65%) participants discussed organization factors potentially impacting whether to select an OT instead of a traditional procurement agreement.

Appendix AA provides more information on the factors discussed by participants for this interview question. The significant findings for Interview Question 1a are:

Organizations select OTs instead of traditional procurement agreements because OTs help them field new advanced technology capabilities and enable them to do business with nontraditional contractors. OTs are an emerging area of procurement at some organizations.

The majority of participants (13 of 20) discussed organization factors potentially impacting whether to select an OT instead of a traditional procurement agreement. Some participants believed that OTs provide a procurement process that enables their organization to field new capabilities more quickly than traditional procurement agreements. For example, one participant discussed his experience using OTs while working at the Pentagon: “Our job was to take concepts, and develop it and build it, and put it in the field within a couple of years. This was supporting the stuff in Iraq and Afghanistan and stuff like that, so we would take a concept paper and try to field it within two years, so some very fast-tracked stuff” (MDA).

Another participant talked about how he lost funding because of the lengthy administrative processes associated with traditional procurement agreements. “I lost money as a program manager, two-year appropriated dollars, I lost it because [the contracting office]

couldn't execute fast enough . . . The everyday, normal, smaller programs, the R&D programs, well, those were very long, and lengthy processes, [the contracting office] has a tendency to over-design their processes. They've got do-loops within do-loops" (TARDEC).

Other participants pointed to DoD technology needs as the primary organizational factors influencing whether to use an OT. Along these lines, one participant explained:

The fact that should influence it is how badly I want that technology. As we keep ourselves warm with these regulations that comfort us, how willing will DoD be to leave the comfort of the regulations in order to get the technology that they want, because they otherwise couldn't get? I think that should influence when an OT is appropriate. Because the safeguards were created over time for a reason. It's really, OTs perhaps are not appropriate for commodity purposes, but for unique cutting-edge or novel technologies (DPAP).

Another participant framed this factor in terms of supporting DoD customer needs:

We help Army customers decide to do OTs and assist them in negotiations and other aspects of the OT process . . . Our goal is to help customers decide whether they have a suitable prototype, suitable technical objectives and whether the OT will enhance mission objectives . . . We help our Army customers decide whether appropriate nontraditional contractors are involved (PIC).

Following this theme, other participants saw OTs as a better process for engaging advanced technology contractors. For instance, one participant viewed OTs as a method to help nontraditional contractors evolve to become traditional DoD contractors:

I like to take a little more thoughtful review of why we would pick an OT. There are a lot of things to consider. For example, we go to a nontraditional company generally, but there are some nontraditional companies that in fact want to become traditional companies . . . We'll help them wade through the terms and conditions. I think that puts them in a better place if, in fact, their long-term goal is to become a supplier to the Department of Defense (DARPA4).

Another participant discussed how OTs offer an optimal method for doing business with nontraditional contractors that would not otherwise do business with DoD:

Our organization . . . Is set up to do business specifically with nontraditional vendors in areas like Silicon Valley, Boston that don't normally want to do business with the government because they find the procurement processes deemed to be slow, cumbersome, bureaucratic, and that takes a really long time and doesn't have a lot of flexibility for the vendor . . . So, having that flexibility to go back and forth, depending on the particulars of the company, the technology, and the customer, is really powerful for us (DIUX).

Several participants discussed how OTs represent a new segment of their organization's contracting practice. For example, a participant stated, "When I came onboard in February [2017], one of the first projects that I was given was to figure out a way in which we can bring in the OT as an acquisition vehicle for specific types of acquisitions that would fit within the space of OT authority" (DTRA). Another participant discussed how his organization was still exploring how to use OTs:

The honest answer is we started doing this just for exploration. We didn't understand it, and a lot of follow-on questions will help this come out. It wasn't truly known of what we do. We've heard that it was something that other than . . . Our normal traditional approach. So, what we had done is went out exploring that that idea with one of the consortiums (NAVYHQ).

Other participants explained that their organization is not using OTs or had just started to explore to what extent it will use OTs. For example, a participant that worked at a policy office in the Pentagon stated, "Our policy shop, we didn't let any OTs. We don't let any contracts

ourselves. For a brief while, I was going to take over [OTs] . . . But that never got off the ground” (DPAP). Another participant who also worked in a policy office at the Pentagon stated:

When I was in the Pentagon, I was really in an oversight capacity, so I wasn't really making direct decisions on selection of contracts. We expected the [Military] Service on a major acquisition like the Army FCS to come forward with an acquisition strategy, an acquisition plan and within that was contained the contractual instrument and the intentions with that instrument . . . I really wasn't directly involved in making that decision (NSC).

Some participants discussed that OTs have only recently started to be used by their organization. For example, one participant explained that:

Actually initially, prior to February of 2017, there was not a lot of usage, there was only one instance where they actually used an OTA vehicle to execute a contract, and that was in collaboration with the joint program executive office. Prior to that, there has never been one under the new OTA guidelines (DTRA).

Another participant stated that his organization is moving towards 100% use of OTs, noting that they will soon “be using OTs as its primary contracting vehicle” (PEO-CBD).

Significant findings for interview question 1b

Interview Question 1b is: If you select an OT, what factors can influence negotiations to succeed? Of the 20 organization participants interviewed:

- 6 of 20 (30%) participants discussed contractor factors potentially influencing OT negotiations to succeed.

- 9 of 20 (45%) participants discussed joint organization and contractor factors potentially influencing OT negotiations to succeed.
- 4 of 20 (20%) participants discussed legal and policy factors potentially influencing OT negotiations to succeed.
- 6 of 20 (30%) participants discussed DoD organization factors potentially influencing OT negotiations to succeed.

Appendix AA provides more information on the factors discussed by participants for this interview question. The significant findings for Interview Question 1b are:

Joint factors, including the amount of prior experience that parties have with OTs, mutual trust and open communications, being flexible, and understanding the other party's legal limitations or business needs can potentially influence OT negotiations to succeed.

Some participants (9 of 20) cited joint organization and contractor factors potentially impacting the success of OT negotiations. One factor identified was the experience of the parties with OTs:

Based on my experience, the typical factors that would influence the success of an OT negotiation boils down to the experience and understanding of the OT by contracting officer and the program manager, as well as the experience on the contractor's side with the OT (DARPA1).

Following that observation, and given that OTs enable the parties to draft the OT together, another participant added that successful OT negotiations depend on how well the

statement of objectives and the statement of work are written (PEO-CBD). Mutual trust and open communication between the parties was another factor that participants thought was important to successful OT negotiations. The need for trust is critical because an OT starts with a blank sheet of paper, and thus all terms and conditions must be mutually negotiated. So, one participant noted, “If people want to trip each other up, then it's very easy to do so because you are starting with that blank piece of paper. Everything has to be negotiated” (DARPA2).

Another participant made similar remarks, observing that:

So, probably the biggest one I've learned is open communications. Because it's sort of a clean slate process when you're doing other transactions. So, you have to be able and willing to communicate openly and honestly with your partners, what I call them when I'm doing my other transactions not necessarily as a performer, I refer to them as our partners. So, you want to make sure they are able to communicate openly and honestly, and I find the negotiations that go well are because we are on both sides able to do that (DARPA4).

Flexibility by DoD organization was also a factor impacting successful OT negotiations:

Like I said, being flexible, right? So, not digging your heels in and as an established PCO you're used to working on the FAR-based side of the house, right? Not being positional, right? Making sure you understand what the other side is thinking as well. Sort of the open communication approach, right? Seek first to understand then to be understood, but that's important, right? It's not just a catchphrase. It's the, in my mind, the lifeblood of getting these OTs done (DARPA4).

Several participants emphasized the need to be patient with the other party as another factor related to trust and open communications:

So, I think having that up-front understanding and that we're both coming from two different sorts of environments of dealing with contracting and having a little more

communication, maybe a little more patience than we would have otherwise, I think sort of helps out to try to contribute to a successful negotiation (SPAWAR).

Another big factor is understanding between the parties, the government and the contractor. We help these parties talk to each other and realize the advantages of OTs compared to traditional procurement agreements. If you do not have collaboration between the parties, we know from experience that negotiations will bog down and the negotiation will not go forward. So, when we communicate with our Army customers, we stress collaboration in capital letters in writing so that they know they have to have a new mindset and actually collaborate with the contractor on developing the requirements for the OT and negotiating (PIC).

One participant believed that the DoD organization being sensitive to the contractor's business needs and fears of federal procurement are important to successful OT negotiations:

I think going in with a mindset that you want to succeed. DARPA is not going to succeed unless their performers succeed. So, you have to go in with a mindset that we need to work with a performer to make them comfortable and make them succeed . . . There are a lot of fears the companies have based on hearsay. They've heard rumors about the byzantine bureaucracy of dealing with the government, which in many cases is true. But at DARPA I think we're able to get beyond that. When you understand what their fears are, you can talk them through what it is that we can do to mitigate those fears (DARPA3).

Significant findings for interview question 1c

Interview Question 1c is: If you select an OT, what factors can influence negotiations to fail? Of the 20 organization participants interviewed:

- 5 of 20 (25%) participants discussed contractor factors potentially influencing OT negotiations to fail.

- 8 of 20 (40%) participants discussed joint organization and contractor factors potentially impacting OT negotiations to fail.
- 3 of 20 (15%) participants discussed legal and policy factors potentially influencing OT negotiations to fail.
- 6 of 20 (30%) participants discussed organization factors potentially influencing OT negotiations to fail.

Appendix AA provides more information on the factors discussed by participants for this interview question. The significant findings for Interview Question 1c are:

Joint factors, including lack of trust between the parties, poor communications, and the parties being inflexible with each other can potentially cause OT negotiations to fail.

Some participants (8 of 20) discussed joint (organization and contractor) factors that can potentially cause OT negotiations to fail. Participants pointed to the need for trust between the parties. For instance, one participant discussed that OTs start from a blank sheet of paper.

There's no prescribed template . . . You really are starting from a brand-new position with every new OT. Something that could cause it to fail is that the parties are distrustful of each other. There's still certainly some terms and conditions that have to be negotiated. If trust is not there, then it would be difficult to form an agreement that would be mutually beneficial “(DARPA2).

Another participant discussed trust as an intrinsic element of how her organization negotiates OTs with nontraditional contractors:

We also, as part of our process, openly collaborate with companies and communicate when we're designing a statement of work itself and the project itself. So as opposed to, under traditional government acquisition where the company puts together a proposal kind of behind a firewall and then submits it over the fence for the governments to evaluate. And the project with the company after we selected them to work with us, which is really important to the company as well because they feel like they are having a say (DIUX).

An added participant rhetorically asked and answered: “Once your organization says we're going to do an OT, what can lead to failure of the negotiations? What can lead to the OT negotiations not reaching an agreement? Because you have mutually exclusive agendas” (OSD). Several participants discussed a factor related to trust—communication between the parties. One participant framed this need for communication in practical terms:

I mean if you're not communicating with . . . That company and how they know what you're looking for or what you need or . . . So that would make up a certain failure. At that point, now you're just both blindly going down the road with no real insight (NAVYHQ).

A further participant echoed this practical view of the need for good communications in OT negotiations, observing that:

So, a lot of times negotiations when they hit roadblocks it's because you're not able to communicate those things to each other. What's really on your mind, what your real concern is instead people start to take positions. Not being willing to listen to what the other side has to say and to understand what their concerns are to have stop and listen, will sabotage or hinder your ability to negotiate big-time (DARPA4).

Another participant summed up the role of communication in successful OT negotiations by stating how “breaking down those barriers to communication are really important in the overall deal” (DIUX). Even with trust and good communications, OT negotiations can fail if the

parties are inflexible on the OTs terms and conditions, particularly where a lot of money is at stake. One participant found that the lack of flexibility and money could cause such failure when “One side sticking to, you know, a firm position, and money, money, money” (PEO-CBD).

Another participant more directly attributed OT negotiation failures to “not being flexible” (DARPA4). Following this theme, an additional participant remarked:

Well, I mean I think not having flexibility by either party and willing to accept something other than what you're used to is probably going to be the main thing I can think of that would lead the negotiation to fail. I think the lack of flexibility and lack of trying to maybe think a little bit differently is probably what's going to lead to failure most often (SPAWAR).

Related to flexibility, a participant discussed the necessity for collaboration between the parties, lest the negotiation process devolve into the protracted, formalized negotiations that typify traditional procurement agreements:

If they're not, and I tell people this as we tell them it's now collaboration time, so you start collaborating. If they don't collaborate, we know because negotiations then become, it's a little bit of a back and forth, like regular negotiations would go (TARDEC).

Lack of knowledge about OTs can also cause negotiations to fail. One participant discussed this source failure as arising from the lack of clearly defined project milestones: “If you don't have clear milestones, I would say that would be a roadblock for OTs. If you have somebody, who's not knowledgeable about OTs or executing OTs that could certainly hinder the process” (DARPA2). Finally, one participant noted that there had not been any OT negotiation failures in his organization: “We haven't had any, at least since I've been on; we haven't had any that have broken down” (PEO-CBD).

Major findings for interview question 2

Interview Question 2 is: What do participants believe are the advantages of OTs compared to traditional procurement agreements? Interview Question 2 includes three subsidiary interview questions:

- a) What are the advantages of using OTs compared to traditional procurement agreements such as contracts, grants, and cooperative agreements?
- b) How do the advantages of OTs impact use of OTs in your organization?
- c) How do the advantages of OTs impact use of OTs in other DoD organizations?

The significant findings for Interview Questions 2a-c are:

- a) OTs offer flexibility advantages over TPAs, including the ability to tailor the OT terms and conditions, funding advantages such as cost-sharing and advance payments, reduction in administrative workload and process time, improved collaboration and communication between the parties, and enhanced access to contractors that generally would not do business with the government.
- b) Increasing dollars are being spent on OTs by DoD organizations. OTs are enabling organizations to achieve new technology solutions for mission needs. Organizational learning about OTs has resulted in more successful OTs, which in turn has increased the use of OTs by DoD organizations.

- c) The word is spreading across DoD organizations about the benefits of OTs. This has recently resulted in more DoD organizations using OTs. However, cultural factors such as risk-aversion and entrenched bureaucracy continue to oppose more significant impact of OTs in other DoD organizations.

The significant findings for Interview Questions 2a-c lead to the following major findings for Interview Question 2:

OTs offer more flexible terms and conditions than TPAs and improve communication and collaboration between the parties. OTs are enabling organizations to achieve new technology solutions for mission needs. The word is spreading across DoD organizations about the benefits of OTs. This has recently resulted in more DoD organizations using OTs. But cultural factors such as risk-aversion and entrenched bureaucracy continue to oppose more significant impact of OTs in some DoD organizations.

The following discussion summarizes significant findings for Interview Questions 2a-c.

Significant findings for interview question 2a

Interview Question 2a is: What are the advantages of using OTs compared to traditional procurement agreements such as contracts, grants, and cooperative agreements? Of the 20 organization participants interviewed:

- 18 of 20 (90%) participants discussed flexibility advantages of OTs compared to traditional procurement agreements.
- 6 of 20 (30%) participant discussed speed and efficiency advantages of OTs compared to traditional procurement agreements.
- 11 of 20 (55%) participants discussed organization advantages of OTs compared to traditional procurement agreements.
- 7 of 20 (35%) participants discussed contractor advantages of OTs compared to traditional procurement agreements.

Appendix AA provides more information on the factors discussed by participants for this interview question. The significant findings for Interview Question 2a are:

OTs offer flexibility advantages over TPAs, including the ability to tailor the OT terms and conditions, funding advantages such as cost-sharing and advance payments, reduction in administrative workload and process time, improved collaboration and communication between the parties, and enhanced access to contractors that generally would not do business with the government.

The large majority of participants (18 of 20) discussed flexibility advantages of OTs compared to traditional procurement agreements. One theme among participants was that OTs provide the government with the ability to draft favorable terms and conditions for the government. The following is a sample of participant remarks under this theme:

The advantage is that I can actually negotiate to get exactly what I want with the contractor. We can talk about it. It also is allowing me to get these teaming arrangements that are a better value to the government, especially since we have to develop some operational things. I mean, we really have to transition. It gives us a lot more flexibility in negotiating that (SCO).

It's being able to write your own terms and conditions. That was a big advantage for a lot of this, and seeing perspectives from another company, because you could actually understand the position they were in, and you could tailor terms and conditions of the agreement, and you weren't so limited by the authority of the FAR and other regulations. I think that's a big advantage over the traditional approach (MDA).

It seems like flexibility is the chief advantage that I think they see in OT agreements. I think that's flexibility on a couple different dimensions. I think it's flexibility in terms of the actual form of the agreement and what sort of terms can be used in it, so when they're drafting it, not having to follow the FAR or go through the procedures for deviating from the FAR and these types of things (AFHQ).

Several other participants discussed terms and conditions in the context of the advantages that OTs offer to both parties. Examples of participant remarks under this theme are:

The convenience is having the wide discretion to be able to think situationally about the problem, and then draft an arrangement that both parties like. It's hard for somebody that's been in a regular [traditional procurement] contract to think about (DARPA4).

You've got the advantage of coming up with this flexible agreement that has terms that the commercial partner can really find acceptable (SPAWAR).

Participants also discussed that OTs offer advantages to OT consortiums related to flexible terms and conditions. One participant explained this advantage in the context of the OT consortium members informally agreeing not to challenge the award of an OT project to another consortium member:

It's very simple, and it goes back to the authority that it brings. It's not confined by the FAR, which you know is very constrictive. If you work with the consortium, the consortium members agree that they will not challenge a selection of one particular consortium member over another. There's a lot of value in that, because as you know if you have someone challenges a decision of which performer you selected, that could take months, and sometimes years, to execute that particular contract and you're stuck (DTRA).

Another aspect of flexibility is the ability to tailor standard terms. Participants discussed how OTs offer more opportunities to tailor the agreement than a traditional procurement agreement. For instance, one participant contrasted traditional procurement agreements with OTs by observing that:

Each of the different instruments has different pros and cons with them. I'll start with the procurement contracts. The benefit is . . . All the safeguards have been put in place . . . [for OTs] you can evaluate whether they're necessary or not. If they're not necessary, you can do things faster. You can create conflicts of interest. You can create arrangements that are not linear . . . You can create unique arrangements (DPAP).

Other participants discussed tailoring from the perspective of negotiating the agreement, for example:

You're not walking into one particular thing or one particular set of rules about how you do something. So, it's not just the contract or the agreement structure itself that you can vary, but it is also the way in which you go about competing for, soliciting for that particular agreement. You don't have to follow the FAR and other laws of procurement-based contracts. And that flexibility is still important because it really allows you to design a procurement process or an agreement process that works for the particular mission of your organization (DIUX).

Participants commented that because OTs do not have to follow the FAR, this means that they can be tailored to meet the needs of the parties. One participant discussed how the initial OT preparation process is carried out by his organization:

They're highly tailorable; they're very easy to use. For example, when . . . Customers. . . Come to me, they say, we want to do it [an OT], what's the next step? I assign a tech manager, and we say, we're going to help you prepare a scope of work. The scope of work, basically, it's a half a page to a page and a half. It has nineteen questions. We send them these nineteen questions. What is your project? What is your dollar amount? What is the FY? What is the prototype? We give them a questionnaire that they fill out, they send it back, and they refine it. My technical manager works with them . . . To refine it. Once it's good, we send it to our contracting and legal in Picatinny; that's how we've been doing it for several years (TARDEC).

Another participant discussed tailoring in more general terms, pointing to the fact that OTs offer the advantage of being able to pick what parts of the FAR may be useful to use in the OT:

You're not beholden to the traditional, simple arrangements that a procurement contract has. It's you can break things apart freely versus having to do it as a wholesale package. In every piece that you don't like you can just tear apart. So, if you don't like Bayh Dole [a patent statute implemented by a standard DFARS clause] and this applies for grants too, well, if you don't like it you can get rid of it (DIUX).

The ability to tailor specific terms that benefit both parties was another OT benefit discussed by participants. The same participant elaborated on this by noting that:

OTs . . . Grant you a lot of flexibility in designing an arrangement that can be best both for both sides. So, under an OT, you could completely start from the ground up with a blank sheet of paper and write an agreement that works best for both parties. Or you could take a completely FAR-based contract and use something that looks exactly like a FAR-based contract. I think they're a complete advantage because again, under an OT there's nothing that prevents you from putting together an arrangement that looks exactly like a traditional contract, grant, or cooperative agreement (DIUX).

Participants noted that OTs also offer flexibility advantages for funding. One way this manifests itself is that consortium OTs enable projects to get funded using end of fiscal year funding. As one participant explained:

It's really flexible funding. Meaning I don't need to have funding set aside, programmed to execute OT. I can go out with a capability, go try to find a capability, put it in . . . A basket . . . And wait until the funding shows up . . . So, therefore, at the end of the year, if we have money available . . . Then I can get that, rather than what I think most program offices do is just spend it on less priority stuff just to make sure we're spending it (NAVYHQ).

The ability of the government to require the contractor to share in the cost of financing the OT is an important advantage of OTs, particularly to the government. On the contractor side, OTs enable the government to provide advance payments to the contractor. A participant contrasted these funding advantages, emphasizing that they remain unfamiliar to many government employees that have not worked on OTs before: “Cost share is probably one advantage that, again, we don't do a whole lot. We're uncomfortable with it. Advance payments are another topic, like OTs, that we don't talk about” (SOCOM).

Several participants discussed the speed advantages of OTs; how OTs enable the government to reduce administrative workload and process time, resulting in the ability to deliver capability to DOD customers more quickly. Participant remarks illustrating this theme included:

Well . . . It can get rid of a lot of the red tape to go through the process. It can be a lot quicker and help get, you know, for us R&D to the end warfighter, so getting that quickly to the warfighter and getting that research through without having to go through the traditional hurdles (AFRL).

Using OTs can really cut through all that bureaucratic red tape that FAR-based procurement contracts are known for. That's really the advantages of OTs. Their flexibility, perceived lack of safeguards, although there are safeguards, really fits in line with the mission of R&D, the goal of R&D, which is to get the best innovative technical solution from industry (DARPA2).

The ability to tailor an OT was also discussed in terms of improved collaboration and communication between the parties. Several participants addressed this theme:

So, fundamentally, we want better requirements that lead to better proposals that lead to better technical solutions that are delivered faster. At the end of the day, if you had to distill it down, that's what we all want to accomplish. The best way to do that is to have that communication and collaboration at the earliest part of the process, and as much through the process as you can, while still respecting the integrity of the slower selection process, obviously (DOTC).

I think there's a lot more flexibility when using OTs. There's a lot more collaboration obviously underneath the OT authority. There's obviously a price-saver because of not having to follow certain processes that are laid out in the FAR (PIC).

The other thing is, actually that reminds me of another benefit about Other Transaction Agreements: When you have an OTA, you're not under the same kind of restrictions in terms of the kind of communicating you can do with the contractors (OSD).

Some participants discussed flexibility itself. For instance, one participant discussed that the necessity for flexibility is an inherent part of OTs. “When an OT is determined to be the best instrument, it is understood that this is for R&D work which is very innovative, a lot of uncertainties, so the parties are expected to be flexible when they come to the milestones” (DARPA2). Another participant characterized flexibility in terms of the negotiation freedom that OTs bring to the procurement process.

Freedom to do smart things as opposed to things that are prescribed because you have to have an ability to work together, and collaboration that doesn't exist in the traditional FAR-based contracting . . . It is powerful, and to be a government person and observe the dynamics that occur . . . I'm just totally impressed every time we put together an event, or an engagement that I know would not, could not be done normally, and it's the Other Transaction that enables it (NSC).

Another participant discussed flexibility more directly: "I like the Other Transaction Agreement because it gives you the maximum flexibility. If you can get the other party to agree to it, you can put it in the contract" (OSD). Participants also discussed flexibility advantages accruing to the government. One participant explained advantages in terms of the government's ability to leverage the collective talents of a consortium of contractors:

It also gives the government . . . The opportunity to take a few concepts and create a hybrid that translates into a requirement that then goes back out to the industry in a competitive solicitation process. You could never do that any other way. This instrument, the other transaction, with this consortium enables the government to reach out and benefit from the knowledge of industry without just sending out a draft RFP . . . The government right up-front has the ability to formulate a requirement that is more realistic, that leads to competitive processes (DOTC).

Another participant characterized the advantage of OTs as being able to attract large nontraditional contractors that otherwise would not do business with the government:

If you are doing normal acquisitions, you may not have access to some of those nontraditional performers. And even if you do, they don't want to work with you because of the FAR requirements that requires those performers to be able to open up their business books to our way of doing acquisitions. The Googles of the world don't want their business to be looked at, or even quality controlled by the government because we're doing business with them. So, the OT brings in not just small, but also very large companies who don't want the government looking into how they do business with the acquisition (DTRA).

Increased access to nontraditional contractors by using simplified acquisition processes was another flexibility theme that was emphasized by participants. One participant discussed this in the following terms:

It's also flexibility in, I think, it's more fundamental even besides just the particulars of using FAR clauses, but allowing for a species of fixed-price development contracting where it's just generally impractical to we're working with, say, a contract that doesn't have a CAS-compliant system and we want to be able to fund development and being able to enter into a much simpler type of arrangement with them where if we were going to pay for certain lump-sums for certain milestone events. I think the flexibility to do that is very attractive for programs where they're trying to entice a contractor that is not a huge defense contractor, doesn't have all that defense contracting overhead and kind of know-how and being able to work with those on a simpler arrangement (AFHQ).

I hear from a lot of people is the perception that an OT maybe enables a simpler award process instead of a full-blown FAR competition . . . I have seen some uses of, particularly, I'd say, consortium OTs where you award an overarching umbrella agreement . . . Future sub-projects are then competed on a much more streamlined basis among the members of the consortium that's been awarded the overall agreement (AFHQ).

One participant observed that OTs are so flexible that they present no downsides compared to traditional procurement agreements:

For me, in all these years, I haven't found the downside . . . We know there's a lot of downsides to FAR-based contracting, and yet it is the default tool. It's got to continue to be a tool in a toolbox, but I think it ought to be used the majority of the time because you have the ability to do smarter things . . . I don't see a downside to its [OTs] application. In fact, the upside to me is so much more powerful. The upside is, you're engaging a segment of the community you didn't have before (NSC).

Significant findings for interview question 2b

Interview Question 2b is: How do the advantages of OTs impact use of OTs in your organization? Of the 20 organization participants interviewed:

- 15 of 20 (75%) participants discussed organization impacts on the participant's organization.
- 6 of 20 (30%) participants discussed collaborative organization-contractor impacts on the participant's organization.
- 4 of 20 (20%) participants discussed speed and efficiency impacts on the participant's organization.
- 4 of 20 (20%) participants discussed contractor impacts on the participant's organization.

Appendix AA provides more information on the factors discussed by participants for this interview question. The significant findings for Interview Question 2b are:

Increasing dollars are being spent on OTs by DoD organizations. OTs are enabling organizations to achieve new technology solutions for mission needs. Organizational learning about OTs has resulted in more successful OTs, which in turn has increased the use of OTs by some DoD organizations.

A large majority of participants (15 of 20) discussed the beneficial impact of OTs on their organization. There has been the growth in the use of OTs at some DoD organizations. For instance, one participant noted that a joint program manager and his organization "Has basically

mandated we will use OTs because of [their] advantages” (PEO-CBD). Another participant talked about the cumulative impact of successful OTs:

And to watch it [the consortium OT] grow. I mean, the volume of money coming through the program continues to outpace sometimes our ability to keep up with it. Success begets success. People have seen it; they want to be part of it. Our challenge is to make it easy for new customers to come on board because it is a change of how you do business (DOTC).

An additional participant discussed the growth of OTs in the context of the increasing dollars spent on OTs by his organization:

They got it [OTs] going, and they did \$20 million a year, \$40 million a year. Last year, I did \$101 million by the end of the year . . . Closing out, this past Friday, I don't have the final numbers but about \$130, \$135 million. What I have in the pipeline for next year is probably a quarter billion or more. It's going to go up exponentially because of the work with the Program Managers (PMs) that I've been doing the last few months. When the OT moved to Warren [Michigan], they awarded a new OTA . . . It was a seven-year \$700 million contract vehicle. We are probably about 80% through the time and the dollars . . . I just got awarded here a week ago, and that's for a five-year \$2 billion ceiling (TARDEC).

Other participants discussed the impact of OTs on bringing new technology solutions to meet organization needs. The following remarks are illustrative of participant viewpoints under this theme:

Being able to take that technology and combine it with something else that we were doing, and then rushing that concept to the field, we saw some big issues really quick. I think being able to support OTAs was good; the hot companies got the technology and being able to take that and merge it with some of the stuff that we have, it kind of helped solve some of our technology problems. We wouldn't have been able to do that on a contract (MDA).

In developing programs like Joint Light Tactical Vehicle (JLTV), for instance, you're stationary in increasing the capabilities, because you're held hostage to your average production unit cost and those milestone cost constraints moving in . . . The technology is already tasked because you try to keep it stationary, so you have to do redo tasks, those sorts of things. OTAs may help us move those along and insert those later on (NAVYHQ).

If it's something that simply the FAR, if there's some type of arrangement (sic) we want to set up that's just not feasible under the FAR even with the deviation, then I think OTs would probably be where a program would look to try to come up with an acceptable arrangement (AFHQ).

Several other participants discussed the organizational impact of gaining experience using OTs. One participant explained that his organization was motivated to use OTs as much as possible to gain experience in their use: “For DTRA they are very excited about using it. They want to use it. As often as we could, and within the confines of the rules” (DTRA). Participants at DARPA emphasized the level of experience their organization has with OTs and how this impacts future use:

I think the reason OTs have been used a lot in DARPA first is because DARPA's R&D mission. Whether we like OT or not, it serves DARPA's mission. That's pretty much required by the mission of the Agency . . . DARPA's contracting officers are quite experienced with OT. It reduces the risks to the government. Also, DARPA's PMs have more experience than other [DoD] agencies in the area of OTs (DARPA1).

DARPA, being that we're a research and development organization, we're always looking for the best and the brightest. Really, well, we have advocates here for OTs. DARPA was the first DoD agency to get OT authority . . . It's really unlike any other government organization I've ever worked for. DARPA hires the best and the brightest to do a specific job and function in support of the program managers and their mission. Consequently, it's a very efficient process (DARPA2).

Participants at organizations with less OT experience than DARPA commented on how getting initial experience with OTs has had a positive impact on their organization.

So, as we're kind of getting through this process with the first OT and working out the bugs, I think we're figuring out that it is a useful process and we're trying to expand and see where we can use it more. So, I think the fact that it does go through quickly, the benefit actually of the consortium we're finding has benefits associated with it such as we're getting a lot of different small businesses . . . So those kinds of advantages I think will help us to move with the OT going forward (AFRL).

I think the one thing that has kind of contributed to us potentially going the OT route a little bit more than we would have in the past is we've kind of already done one now . . . I think maybe the advantages will actually, in terms of being able to get the deal done quicker and having something to work with, I think those will I guess maybe be a greater advantage in the future because we've kind of done the hard work on a couple of these agreements already and we generally have an idea you know how things are turning out (SPAWAR).

Some participants discussed how the culture of their organization is impacted by using OTs, and vice versa. A DARPA participant noted that success of OTs at his organization is “largely because of our culture,” and that “if other DoD organizations could adopt this kind of same open-mindedness and lack of fear of OTs, then that would go a long way in making them successful” (DARPA2). Other DARPA participants echoed this theme, pointing to particular aspects of the Agency’s culture that impact its use of OTs:

Those are . . . Companies that are used to dealing with grants and cooperative agreements. Mostly grants if it's academic. The funding agencies that traditionally fund them the National Institutes of Health, National Science Foundation, and those organizations, I think are much less aggressive than DARPA in terms of pushing them to achieve better things. I think that's partially due to the fact that the P in DARPA is projects and they've got to get something accomplished under that project (DARPA3).

At DARPA, we're relying on it [OTs] a lot . . . Because we do science and technology, so I think the nature of what we do, they fit very well for what we do . . . Where maybe other agencies are not so comfortable because they do primarily other things but they fit beautifully for S&T. We're in a different place; there are different pressures on us as an Agency in terms of what we actually do . . . And then, of course, they just have a proven

track record of attracting nontraditional (contractors). I could list you a ton of them even, especially in the last year or so, of just folks we have not traditionally done business with that are now willing to come in and to work with us. I can say that the number one reason they do it is because of OTs (DARPA4).

A participant from the Army's Picatinny Arsenal discussed how her organization's experience with OTs increases their organizational impact:

I think at Picatinny [Arsenal], what we have that's valuable is we have [experienced personnel] here, and we have the Defense Ordinance Technology Consortium here which is the oldest DoD, consortium-based OT . . . Our Principal Assistant Responsible for Contracting (PARC) here was instrumental in the development of that. So, they're very comfortable in this; utilizing and leveraging the authority and doing so with proper procedures and things in place. With that benefit of having them here, it's a lot easier for people like engineers here at Picatinny to be comfortable leveraging OTs (PIC).

Another participant discussed the positive cultural impact of OTs on his organization in terms of organizational learning:

Lots of companies came out, and we pushed it, and we would have our industry days, and we would talk about it and put it out in our solicitation and have agreements. We would put it out, and it would be anything. It could be a contract, a grant, cooperative agreement, OTA . . . Once we did two or three [OTs] and people knew it in the program shop, and everybody kind of got used to it and understood it a little bit more, then it kind of flowed in . . . It became a big benefit to us . . . We solved a lot of problems in the field because of the OTAs (MDA).

On the flip side of organizational learning, another participant stressed the need for more training and expertise at her organization and across DoD:

We don't have the education and training system set up for contracting officers at-large. As you know, there are only pockets of expertise in the Department. I don't think it would be a good idea to just blankly grab everybody because we train our contracting officers, for the most part, how to use the FAR and how to use the [OTs] process . . . As

opposed to, now that you're not bound by process, go and make the best deal you can for the circumstance. So that's the first thing we'd actually train our people in the Department [of Defense] to be able to use these [OTs] before we can actually let people use them (DIUX).

Significant findings for interview question 2c

Interview Question 2c is: How do the advantages of OTs impact use of OTs in other DoD organizations? Of the 20 organization participants interviewed:

- 8 of 20 (40%) participants discussed flexibility impacts of OTs on other DoD organizations.
- 2 of 20 (10%) participants discussed the speed and efficiency impact of OT on other DoD organizations.
- 14 of 20 (70%) participants discussed DoD-wide impacts of OTs on other DoD organizations.
- 3 of 20 (15%) participants discussed contractor impacts of OTs on other DoD organizations.

Appendix AA provides more information on the factors discussed by participants for this interview question. The significant findings for Interview Question 2c are:

The word is spreading across DoD organizations about the benefits of OTs. This has recently resulted in more DoD organizations using OTs. However, cultural factors such as risk aversion and an entrenched bureaucracy continue to oppose more significant impact of OTs in some DoD organizations.

The majority of participants (14 of 20) discussed DoD-wide impacts that OTs are having on other DoD organizations. One theme that participants spoke about was how the word is spreading about the benefits of OTs compared to traditional procurement agreements. For example, several participants discussed this theme in terms of increasing awareness about OTs in other DoD organizations:

I also think the more the workforce is informed on OTs; there will be greater potential for its use. It will be important for the community to see and experience some wins after using an OT. If the community sees its value and the results are capabilities for the guys on the ground, that they need today, more people will potentially want to utilize them. I think when the community hears of the success stories, it can spread like wildfire (SOCOM)

I think just from watching from the outside and watching the trends that are going on. I think people are starting to recognize the advantages of other transactions. That it [OTs] can knock down barriers and provide access to a group of performers, the researchers that we normally just don't have access to. And because the DoD is no longer pushing technology, really, we're no longer close to even being in that position anymore . . . The S&T level is where industry wants to take it, and we try to find the most advantageous places to put ourselves. So, I think people are seeing that now (DARPA4).

Another participant that supports a consortium OT discussed how she has seen an increasing impact of OTs on the Military Departments over the last several years:

In the last few years, I've seen a lot change, in fact, a big change in the Army in favor of using OTs. I've seen more OTs being used in the Air Force as well as the Army. A couple of years ago the Air Force had an initiative where it decided that it should try to use OTs for almost every type of procurement first and then only after an OT was not suitable would it try regular procurement. That policy initiative appears to have passed, but there still seems to be more emphasis in the Air Force on OTs, and there were in prior years. So, across DoD I have seen more use of OTs, particularly in the Air Force and the Army. I think the advantages of OTs starting to get out and everyone is beginning to understand they are good things (PIC).

Other participants questioned whether there had been enough information publicized about OTs to support their wider use across DoD.

Even though they're flexible, to what extent quantified how DoD organizations are using it. I can tell you that they can be used a lot more. You have contracting people who have never heard of OTs and actually understand what they are and what they can do and what benefits they have. I don't necessarily think that we're frightened about OTs. And I think the only thing that stops us are from doing OTs is maybe with some people, maybe the lack of knowledge or the perception that they're just more complicated because, again, there's no guide on how to craft the perfect OT (DARPA2).

I haven't gathered any information from any other labs or Army or Air Force to see if they've used OTs or what their experience was. So, I haven't really seen how anybody outside of our Command really works with OTs or if they're benefiting or not (SPAWAR).

Participants discussed new users—for instance, newly established DoD organizations—that are turning to OTs to meet organizational mission needs. One participant discussed how the impact of OTs on an organization is related to the organization's mission:

It depends on the mission of the specific agencies. Not all agencies need to use OTs or have any specific needs for OT. If it's a totally services contract, like Defense Logistics Agency (DLA) for example . . . I'm not aware of any significant R&D efforts over there [at DLA]. Most of their contracts are primarily either supplies or services. The existing FAR-based contract schemes should meet that requirement. Particularly in light of the disadvantages or lack of experience of government contracting officers or government program managers . . . It may not be good for all agencies to use [OTs] if a FAR-based contract is OK (DARPA1).

Other participants discussed how they have seen OTs make a positive impact on other DoD organizations. For instance, two participants discussed the impact of OTs on the Defense Intelligence Agency (DIA) and within the DoD medical research community:

I've still got friends at DIA and stuff, and I've talked with them. A lot of them are trying to just get away from contracts altogether. A lot of people that are using them and understand them, I think they get advantages from them, and they're just trying to go straight OTAs and . . . And they're just trying to just do OTAs, period, just get away from contracts and grants and cooperative agreements (MDA).

The medical Chemical Biological, Radiological, Nuclear (CBRN) Defense Consortium . . . They're actually soliciting for another new consortium as we speak, one focused on counter Weapons of Mass Destruction (WMD). We've seen the medical community, so we actually have another one with USAMRAA, funded by USAMRAA . . . So, a different acquisition community learning about OTAs and applying them to medical technologies that serve both the war fighter and non-warfighters (DOTC).

Some participants discussed the impact of OTs more broadly, noting their effect on the Military Departments—the Army, Air Force, and Navy.

I would have to say that I haven't seen the services actually using them, except maybe the Navy . . . Has used them extensively if it's a munition. So, the Navy is using them (SCO).

I'm generally seeing the change in the Army. But I am seeing it in the Air Force as well; with Air Force headquarters too, for a while, with helping them establish their wider use of OTs within the Air Force and leveraging that . . . I've worked with many Air Force organizations that you know they're starting to dabble in OTs . . . But they also leverage the existing communities that we've established as well (PIC).

I will tell you this. As a result of the work that my organization has done using Other Transaction Agreement—because we work with every [military] service—I don't think there is a laboratory or engineering center in the Department of Defense that we don't work with . . . We say to Commands, hey, we want you guys to work with us on this Other Transaction Agreement . . . I know we've had a direct impact on getting other organizations across the Department of Defense to use OTAs (OSD).

But there is continued resistance to using OTs. For example, one participant stated that he had seen little use of OTs, and reluctance to use OTs suggests the need for leadership advocacy for OTs. “Until you have leadership, like mine here, that are saying we need to try

other tools that are in the toolbox in order to help us get out in front of the enemy, we will continue to see a reluctant workforce” (SOCOM). Several participants talked about the potential positive impacts of OTs being diminished because of a pervasive institutional cultural factor—bureaucracy. One participant discussed this in terms of what he called the “entrenched bureaucracies” in DoD and how stakeholders in these bureaucracies resist the positive impacts of OTs:

I never heard of OTs until I came to DARPA . . . I've talked a little bit to some Navy organizations, and I think they're just feeling out what the appropriateness of using an OT . . . But I think there's a real conservatism in the Department of Defense. There are entrenched bureaucracies that have stakeholders that want to protect their stakes and sometimes an OT will bypass that (DARPA3).

Another participant discussed the entrenched bureaucracy in terms of what he called the DoD “risk culture” and how this culture influences the impact of OTs on DoD organizations:

I would say the risk culture we have in DoD . . . We (DoD) try and use process to deal with every procurement, and when something goes wrong, the result is always, well, let's add more process to fix that in the future. And it is not always apparent, but it is at all levels. You know, Congress does it. DoD policy does it. Individual service acquisitions organizations do it. Individual commands do it. And what that creates is just this giant amount of paperwork and process that each individual has to follow. If we are going to get out of that, and embrace each of those things, we have to also allow for reasonable failure . . . There's some sort of adoption cross-Service within DoD for some of these things where if one Service is doing it, then I think it makes it a little bit easier for other Services to help rely on some of that work and take advantage of some of the agreements that they had in place (AFHQ).

On a more promising note, another participant's saw institutional culture in a different light, observing that he has seen a sea change in the impact that OTs are having on other DoD

organizations. This change was sparked by a DoD-wide OT workshop that was held in November 2016 by the USD (AT&L):

I think it's not there yet, but I am seeing somewhat of a sea change at this point . . . The workshop . . . Last year for other transactions . . . It was a resounding success . . . I wanted him to make the consortium construct one of the fundamental tenets of his better buying power, basically fundamentally changing the engagement with U.S. industry and academia through the other transaction and consortia. I wanted that to be the default, or how do I attempt to get him to think regarding, this is going to be the norm for doing business in the Defense Department going forward because it makes sense (NSC).

Major findings for interview question 3

Interview Question 3 is: What do participants believe are the disadvantages of OTs compared to traditional procurement agreements? Interview Question 3 includes three subsidiary interview questions:

- a) What are the disadvantages of using OTs compared to traditional procurement agreements such as contracts, grants, and cooperative agreements?
- b) How do disadvantages of OTs impact use of OTs in your organization?
- c) How do disadvantages of OTs impact use of OTs in other DoD organizations?

The significant findings for Interview Questions 3a-c are:

- a) OTs are not routine: They take longer to negotiate than traditional procurement agreements, particularly with nontraditional contractors. For OT negotiations to succeed, the government and contractor must dedicate experienced personnel. The flexibility of OTs can lead to

failure to include important terms and conditions and increase the probability of repeating mistakes from the past that are addressed by procurement regulations. The cost-share and nontraditional contractor participation requirements of the OT statute may dis-incentivize some traditional contractors from participating in OT opportunities.

- b) DoD organizations are unfamiliar with how to use OTs. Organization personnel fear the unknown and are hesitant to try new types of procurement processes such as OTs. They resist OTs using because they are fearful of making mistakes and negative audits by the DoD IG. DoD organizations that have programs to deliver goods and services resist using OTs because OTs are believed to be suitable only for R&D projects. Some DoD organizations view OTs as a last resort and only use OTs when it is impossible to do a traditional procurement agreement.
- c) There is resistance to change [OTs] by contracting officers, program managers, and organization leadership. Procurement professionals and program managers fear losing control of procurement processes and giving up their turf. Some DoD organizations have rigid leadership that punishes procurement failures and mistakes. The audit-prone and risk-intolerant culture of DoD discourages DoD personnel from trying OTs. The stigma OTs got from the Army's failed FCS program continues to impact use of OTs by DoD organizations.

The significant findings for Interview Questions 3a-c lead to the following major findings for Interview Question 3:

OTs take longer to negotiate than TPAs. The flexibility of OTs can lead to failing to include essential terms and conditions in the OT. DoD organizations are unfamiliar with how to use OTs

and may only use OTs as a last resort. DoD organizations resist change and contracting officers, and program managers fear losing control and turf. The audit-prone and risk-intolerant culture of DoD and rigid organization leadership discourage DoD personnel from trying OTs. The stigma that OTs got from the Army's failed FCS program continues to impact DoD organization use of OTs.

The following discussion summarizes significant findings for Interview Questions 3a-c.

Significant findings for interview question 3a

Interview Question 3a is: What are the disadvantages of using OTs compared to traditional procurement agreements such as contracts, grants, and cooperative agreements? Of the 20 organization participants interviewed:

- 8 of 20 (40%) participants discussed experience disadvantages of OTs compared to TPAs.
- 15 of 20 (75%) participants discussed OT negotiation and administration disadvantages of OTs compared to TPAs.
- 12 of 20 (60%) participants discussed organization culture disadvantages of OTs compared to TPAs.

Appendix AA provides more information on the factors discussed by participants for this interview question. The significant findings for Interview Question 3a are:

OTs are not routine: Their flexibility means the government can fail to include essential terms and conditions and increase the probability of repeating past mistakes that are addressed by the FAR and DFARS. OTs typically take longer to negotiate than traditional procurement agreements, particularly with nontraditional contractors. For successful OT negotiations, the government and contractor need experienced personnel. The cost-share and nontraditional contractor participation requirements of the OT statute may dis-incentivize traditional contractors from participating in OT opportunities.

The large majority of participants (15 of 20) discussed disadvantages of OTs from the perspective of negotiation and administration of OTs. One participant explained how some people have unrealistic expectations about what can be accomplished using OTs:

Many folks are just trying to find any alternative to the FAR, and so they want the fast contracting. I mentioned, you know, they're not for everything . . . They're not magic by themselves. Folks have unrealistic expectations about what can and cannot be done with them (DOTC).

The same participant talked about the disadvantages of OTs from the perspective of their historical background. The participant discussed how past problems with the Army FCS program OTs continue to have a negative impact on the current DoD OT program. “Everybody knows about FCS and some of the programs where it was abused, and unfortunately tarnished the model, and it's taken a while to come back from that” (DOTC). Another participant discussed the role of agreements officers and how giving these employees too much independent authority to conduct OT negotiations may lead to suboptimal results:

The downside is . . . The agreements officer otherwise has full authority to decide unilaterally any decision, any protest, any disagreement. And the downside of that potentially is that no one has yet thought of how to manage that. I feel as it proliferates, there's no control or checks and balance on the contracting officer . . . Everything pivots on that contracting officer or the agreements officer. The agreement is only as good as the person who is signing off on the document (DOTC).

The same participant questioned whether agreements officers are the only ones who should be able to negotiate OTs for the government:

It begs the question is (sic), should the agreement officer be someone from contracting? Because if you're going to try something new, why go with someone who has been trained to do and think and be rewarded a certain way? By going with an agreements officer, you also skew in incentive because the program manager's responsible for the mission's success, but the agreements officer is in charge of contractual success . . . There's an argument that says there shouldn't be an agreements officer; it should be the program manager and the person who signs the agreement should be . . . More of an administrative role. A disadvantage is it has a single point failure. That's where I think the weakest part is, the agreements officer (DPAP).

Several other participants discussed how consortium fees are a disadvantage of OTs compared to traditional procurement agreements. These fees are charged to the government to help pay for administrative costs such as the salaries and costs associated with the consortium management contractor. Participants discussed consortium fees as a potential disadvantage of OTs, for instance:

The DOTC contract [consortium OT] charges me a 4% pass-through . . . Plus then there's some money back to contractors . . . They also have a disclaimer. So, I'm paying a 4% fee, they don't give me technical help, and they disclaim that any of the integration stuff is their issue. If something goes wrong, that's, whatever, it's on you . . . For 4% fee, I would like to actually have a little responsibility or accountability on their part (SCO).

One other thing with the OTA that folks may see as a negative is there is a fee involved. We charge 5% for a fee . . . It pays for my contracting folks in Picatinny [Arsenal] and

my legal folks. 2.5% of the fee goes to my consortium to run the consortium. The consortium, they are trying to get folks to join. They pay a \$500 a year fee for that consortium (TARDEC).

Several other participants discussed that it takes longer to negotiate an OT than a traditional procurement agreement and that this added time is a significant disadvantage of OTs. One participant noted: “It takes a very long time, so a very simple impact is that OTs, I would say, on whole, once you've got the system down, I shouldn't say, because the first ones you do, they're going to take just as long as you do for contracts” (DPAP).

Another participant discussed how consortium OTs can be time-consuming to set up: “So, one disadvantage is if you are going to set up your own OT with a consortium that takes quite a long time. Fourteen-plus months. So that's a great disadvantage” (DTRA). Additional participants discussed the purported myth that OTs save time.

Saving time is a myth; it's really about getting capability. I don't think that's well understood among my customer base, for sure . . . Some think it is the easy button. However, from a perception standpoint, the disadvantage is you're starting from a clean sheet of paper. That can be good; that can be bad. When you're starting with a blank sheet of paper, it could take more time to establish those terms and conditions that need to be a part of the agreement (SOCOM). So, and this is the OT myth that just needs to be dispelled: They take more time. They can take more time to get in place from the point at which they are, in our scenario, an offeror is selected to the point at which you have an instrument in place. It typically takes more time to get an OT in place with a nontraditional especially if it's their first time than it does kick out a standard contract to a traditional where, you know, they've received ten thousand of these they know everything in those terms conditions and conditions. With OTs it takes more time, it's a clean slate, and you're often negotiating things that as a contracting officer, under the FAR, you're not used to and you have to negotiate. So, it takes time to ramp yourself up and figure out what your position is, and then work your way through those conversations (DARPA4).

One participant discussed that the only time where OT negotiations go quickly is where there is a very small nontraditional contractor involved that is disinterested in what type of

agreement is used for the project—OT or traditional procurement agreement—and is not risk averse:

The only time they're fast is when you literally have a nontraditional who just is one guy, doesn't have a staff and is completely disinterested and not risk averse, right? Just wants to get in and get going. They will learn over time the pitfalls, right? And they will start to clamp down and hire staff and get lawyers, and those are the ones that happen fast . . . Other than that, it takes time (DARPA4).

The longer time needed to negotiate an OT can dis-incentivize organizations from wanting to do OTs with DoD. As one participant observed:

Not understanding the process or wanting to take the time to set the process up to work. I think that's the biggest problem. It's trying to find that quick procurement, so everybody understands your traditional approach or contract. We even got away from cooperative agreements. We don't even do cooperative agreements anymore, Cooperative Research and Development Agreements (CRADAs), any of that. We're just pretty much straight contracts now (MDA).

OTs can take longer because they require more effort to create terms and conditions that ensure that there are no major blind spots in the agreement. One participant remarked: “So, by default we're spending more time than we would have because we're trying to make sure that things are locked down, and we didn't miss anything, and there are no gaping holes in this agreement that we've just created from nothing basically” (SPAWAR).

Several participants discussed negotiation disadvantages of OTs from the perspective of the contractor. One participant explained how intellectual property and conflicts of interest could present problems for consortium contractors: “Other than the companies getting along and the data rights, then we had a couple that had some conflicts of interest in there too” (MDA). A contractor's experience and negotiation approach to the OT can also be disadvantages of OTs

compared to traditional procurement agreements. The following participant quotes illustrate this contractor-oriented OT disadvantage.

Another situation where we almost suspended negotiation, but we were able to handle it, it was because the contractor treated the whole negotiation as a commercial transaction without acknowledging this is an OT. It's not a commercial transaction. It's not a FAR-based contract, but both parties have flexibility to negotiate. Unrealistic expectations from the contractor can be a disadvantage of OTs (DARPA1).

Contractors ask why we can't use their template and just agree to that. So, I think there's a disadvantage in that there's maybe an expectation on the commercial party's part that it's just going to be a quick and easy agreement to . . . Get done with and the government side, somewhat the exact opposite in the sense of well, you know, we're starting with something new and we don't want to leave anything out, or you know, we want to make sure that we haven't really screwed things up, so to speak (SPAWAR).

Contractors can have internal issues that result in being disadvantageous to OT negotiations. For instance, many contractors, like the government, are used to negotiating traditional procurement agreements and so can find OTs to be novel and time-consuming to negotiate. One participant, who is a contracting officer, observed how this disadvantage plays out for both the government and contractor.

Sometimes I've found that OTs are much more burdensome than FAR-based contracts based on some different factors. One is companies that are used to dealing with FAR-based contracts are not used to dealing with OTs, find it's very burdensome to get through the agreement, and there is additional paperwork internal [to the company], in terms of justifying the OT . . . I sometimes think [contractors] get into that, well it's a panacea. It can't fix everything. In many cases, it is true with nontraditional companies, but I would say it's not always less burdensome (DARPA3).

Another participant discussed how contractors also have bureaucracy that can slow down the OT negotiation process:

And another myth that often is felt is, the government isn't the only one that has bureaucracy. We aren't the only one that can sometimes be slow. Industry, the nontraditional, are slow as well . . . The more zeros that are attached to an instrument of value, to an arrangement's value, the slower the process is going to be . . . When you're buying something that's hundreds of millions of dollars or something an OT, it takes time for them [contractors] to realize what's important to them, what's not important to them. There's a whole life cycle in that negotiation. It has to work its way through (DARPA4).

Other participants discussed disadvantages of OTs for contractors that arise from the language of the OT statute itself. One drawback is that traditional contractors can be reluctant to agree to the requirement to include a nontraditional contractor as part of their OT team:

One disadvantage cited by traditional defense contractor is that OTA's must have a nontraditional contractor added as a significant partner [approximately one-third] on an OTA. The big Original Equipment Manufacturers (OEMs) don't like OTA's since they need to bring in a partner (TARDEC).

If they're a traditional [contractor], they see the requirement for having to have a nontraditional, or one-third cost share, as a negative in their minds. Obviously, that's a positive from some others, but perspectives. I would argue even the nontraditionals are a little bit traditional. Just, again, because the nature of the work (DOTC).

Participants discussed how contractors are discouraged from negotiating an OT if they are required to contribute a cost share to the agreement:

There are people who say that cost sharing dis-incentivizes traditional defense contractors to participate, so that it shrinks the pool because if you're a nontraditional, then I don't believe you have to do the cost sharing, but if you're a traditional defense contractor, then I think you have to put up a one-third cost share. Some people feel that it actually shrinks the pool of interested parties that want to participate in these R&D opportunities (DARPA2).

Participants discussed the negotiation disadvantages of OTs from the perspective of the terms and conditions of the agreement and the negotiations expertise of the parties. From the government's side, one participant stressed that you have to have the right experts available to negotiate the OT. “You've got to make sure that you have the right experts in the room at the same time to ensure you're protecting the government's rights as well as getting that capability that you need to get to the warfighter” (SOCOM). Another participant discussed how the government needs to dedicate sufficient personnel to ensure negotiation success:

When you compare that [TPAs] with the OT system, I think the manpower resources required to negotiate an OT that's going to be a good deal for the government is probably an order of magnitude higher, at least for an organization that is not routinely awarding OTs . . . I think it requires a much higher level of expertise where you really need seasoned contracting professionals to know what to look for as they're crafting and then also go through the time and effort of actually crafting an agreement from whole cloth (AFHQ).

This factor also applies to contractors. The contractor has to dedicate experienced personnel to negotiate the OT with the government. According to one participant, if the contractor does not do this, it can lead to “FAR-creep”:

The main disadvantage I would say, is more from the perspective of the user and the company, meaning the requirements office and the company, is they really need to have a full understanding of what OT authority is all about before dabbling in this arena, because I think if you don't have the experience and the comfort level in operating in this environment, all of that, we call it “FAR-creep” starts to be introduced, and it's not necessarily appropriate (PIC).

Other participants discussed how the relative lack of boilerplate terms and conditions could be a disadvantage for negotiating an OT for both parties. One participant explained drafting terms and conditions from scratch creates a risk to the government:

A potential disadvantage is that you are crafting that [OT] language from scratch whereas the FAR and DFARS have already gone through the process of setting up terms and conditions for different types of situations . . . The fact that they're not subject to the FAR and DFARS, that's a benefit right, but in the same sense a disadvantage . . . You still need terms and conditions to cover risks and uncertainties and to protect the government (DARPA2).

But the flexibility inherent in OTs because of their fewer predetermined terms and conditions also has a downside—the parties are free to repeat mistakes made in the past.

I think the biggest disadvantage is that you have freedom to operate in a much more streamlined manner, but you also have freedom to ignore the mistakes that were made in the past that were supposedly corrected by the regulatory procedures in place that are guiding the normal ways of doing contracts, grants, and cooperative agreements (DARPA3).

I think that's probably the biggest drawback to an OT is that it's the dark side of the flexibility; it's that you've got enough flexibility to do something stupid . . . I think probably in a research organization that probably does a lot of OTs, and that has developed its own even informal forms that they can rely on where they know oh, we did an OT last year that's a lot like what we want here. Let's dust that OT off and maybe tweak it here or there for things that it turned out weren't quite right in that agreement and then fix it to be a little bit better for this particular circumstance (AFHQ).

Other participants discussed the lack of predetermined terms and conditions as being disadvantageous from the perspective of not being able to take any shortcuts with the agreement. One participant characterized this disadvantage as OTs not being “customary”:

The other disadvantage of the OT is it is not customary. In that, you can't just go pick up another contract that was written and cut and paste out of it . . . You can't take shortcuts with OTAs. You have to be deliberate about every sentence in that Other Transaction Agreement, and that can be off-putting (OSD).

Finally, participants remarked about specific areas of negotiating terms and conditions that can be disadvantages for OTs compared to traditional procurement agreements. For instance, one participant discussed how the government must be attentive to ensuring sufficient competition in selecting the OT contractor. “You don't want to cross boundaries to make it look like it's a good old boys club or something that's not fair and equitable because we do have to maintain that standard” (DOTC). Other participants contrasted OTs with traditional procurement agreements, observing how the FAR and DFARS offer negotiation clarity compared to traditional procurement agreements:

The unknowns [of OTs] are another disadvantage. The FAR has very clear guidance on the terms and conditions that must be included in the contract when considering what you are buying and the associated dollar thresholds. When you don't have those boundaries and set guidance, you could potentially leave out really important terms that should've been considered and then potentially find yourself in a dispute over something that could have been prevented (SOCOM).

If you get it [the OT] set up right, then it runs itself, but if you don't, people don't think through the terms and conditions, or they don't understand what the agreement's about, and then you get some conflicts later on, after you're into work, and then somebody from the surface (sic) talking about what they thought the agreement meant . . . We didn't really have too many disadvantages, personally, except for the data rights stuff (MDA).

Another participant discussed the lack of predetermined terms and conditions in OTs as a disadvantage that extends throughout the whole life cycle of the project, not just OT negotiations:

I don't necessarily agree that they're [OTs] always less burdensome. I think for . . . Major weapons systems acquisitions . . . The DoD instructions . . . Force you to think through the whole program. Not only the development but the logistics tail and the support all the way up to disposal, environmental issues, noise issues at air bases and so forth. A lot of that can easily be overlooked with an OT. A lot of the clauses that you have freedom to

use or not use address issues. For example, in buying a nuclear submarine, [the] Naval Sea Systems Command (NAVSEA) has specific clauses in DFARS dealing with nuclear material and so forth. It's an extreme example, but in OTs you might miss some of the important things like that (DARPA3).

Significant findings for interview question 3b

Interview Question 3b is: How do disadvantages of OTs impact use of OTs in your organization? Of the 20 organization participants interviewed:

- 4 of 20 (20%) participants discussed organization experience impacts of OT disadvantages.
- 5 of 20 (25%) participants discussed organization negotiation and administration impacts of OT disadvantages.
- 8 of 20 (40%) participants organizational culture impacts of OT disadvantages.

Appendix AA provides more information on the factors discussed by participants for this interview question. The significant findings for Interview Question 3b are:

DoD organizations are unfamiliar with how to use OTs. Organization employees fear the unknown and are hesitant to try a new type of procurement process such as OTs. They resist OTs using because they are fearful of making mistakes and negative audits by the DoD IG. DoD organizations that have programs to deliver goods and services oppose using OTs because OTs are believed to be suitable only for R&D projects. Some DoD organizations view OTs as a last resort and only use OTs when it is impossible to do a traditional procurement agreement.

Some participants (8 of 20) discussed impacts the disadvantages of OTs have on the culture of DoD organizations. One participant, for example, discussed how the DoD OT Guide is ambiguous about whether it is a policy or not. While the Guide states that it is not policy, anecdotal evidence suggests that organizations—for instance, the Army—consider the Guide to be prescriptive, thus an enforceable policy. A participant pointed out the organizational culture impact of this dichotomy: “But the thing is, it [the DoD OT Guide] is also a guide and it exists in conflict. How can a guide be prescriptive?” (DPAP). The participant discussed how there is an alternative version of the Guide that was not published and that “The other guide is much more open for interpretation than the one that actually came out” (DPAP).

Other participants discussed fear of the unknown as a disadvantageous impact that OTs have on DoD organizations. Some of this unknown can be traced to the fact that most of the DoD procurement community is only trained and experienced in using the FAR and DFARS for traditional procurement agreements. There is not widespread familiarity with OTs across the DoD procurement workforce. One participant summed up this situation by noting: “We have all grown up in a FAR-based world, so the workforce as a whole is not necessarily raising their hand to try something new. The unknown is scary, right? I believe the unknown keeps a lot of people from trying new things” (SOCOM). The participant also discussed how it takes motivation to try new things: “It takes a special kind of person to think out of that FAR box and say, okay, let's try something new. Let's see how it can benefit us, the organization and then, at the end of the day, the SOF (Special Operations Forces) operator” (SOCOM).

A related cultural theme that participants discussed was the lack of familiarity with OTs across the DoD organizations. One participant, for example, discussed that procurement

employees are busy, and that because OTs take more time to negotiate than traditional procurement agreements, procurement employees are reluctant to use OTs.

People are busy, and they think they can get more done in less time if they don't use an Other Transaction Agreement . . . You can't just do it by habit; you can't rely on muscle memory. You have to be very deliberate about everything you're doing with the Other Transaction Agreement (OTA).

Another participant discussed lack of familiarity with OTs in terms of the amount of effort it takes to find people that have experience with OTs.

I call up somebody that [I] may know from another laboratory. They may have never heard of it [OTs]. Then you call up someone else, and they've never done one before, and they think somebody else in another department may have done one, and they call them up, and so it's a high hurdle to kind of get something in place and you know you may be putting terms together that somebody may potentially be misconstruing down the road when no one is around who created the agreement (SPAWAR).

Another participant, while acknowledging the large amount of time needed to negotiate a first OT, found that investing the time and effort was worth it. “That it's not worth our time or are reluctant to do it, so those disadvantages don't make it tempting to want to do those things. So, it's just a matter of you have to put your mind to it. We've gone through that learning process” (DARPA4). Unfamiliarity with OTs—and the more time OTs take to negotiate compared to traditional procurement agreements—can lead organizations to view OTs as a last resort. One participant summed up this disadvantage as follows:

I think the disadvantages probably are why OTs are maybe looked at as a last resort. I think when . . . Organizations are looking at . . . How do we want to structure our relationship with the company on this effort? They don't look at it as all else equal, is this better as a procurement contract or better as an OT? It's can we do this at all as a FAR

contract, and if so, do that, and if not, then consider an OT approach. But I think for more traditional contracting units . . . It is probably the decision tree is to do it as a FAR contract. If it's absolutely impossible to do it as a FAR contract, consider an OT. I think that probably would contribute to the limited use of OTs in the Air Force and DoD more broadly (AFHQ).

Other participants talked about employee resistance to using OTs in their organizations.

Opposition to using OTs was based on fear of an outside audit, basic unfamiliarity with OTs, and the ignorance of processes for negotiating and administering them.

There had been at the beginning, some resistance to using OTs. It's not familiar, you know, the fear that you're going to do something wrong, fear that you'll do something that'll have legal ramifications. I mean, there's no protest with at OT which is great, but people still think in the terms of protest, or . . . [DoD] IG audits (PEO-CBD).

Because [my organization] didn't want to participate in the OTA back in 2014 and they turned it down. [Leadership] at the time, said, I don't believe in OTAs, I think they're illegal, and we're not going to do them . . . They were supposed to award about 20 OTA projects . . . And I think we got seven done. Problem is, they were reverting back to FAR ways of doing business and long lengthy processes. Since I've got on board, I've been out briefing them and marketing, and I've had pretty good success. I got a couple folks said; I'm going to stick with a FAR-based. I don't know about this OTA stuff, yet. Going from prototype to production. I'm just going to go FAR-based. I think, some cases, after an hour briefing they're still not convinced (TARDEC).

Another participant discussed resistance to OTs and how his organization is focused on programs that deliver goods and services to the military instead of conducting R&D projects. Because the participant's organization was focused on providing products—weapon systems and similar goods and services for military customers—it resisted OTs because OTs are only focused on R&D projects.

It [OTs] didn't flourish . . . The other thing is we didn't have a path ahead, so it was hard to . . . Branch out and say, we should be using more OTAs when we really couldn't get it

going ourselves. I just think we lost focus. It [OTs] was looked upon as a science project. When you're in a program office, we need to deliver a capability if you're going to spend money. That may not be true in some of the labs, in R&D sort of Navy labs scenarios where that's their sole purpose is discovery, but in a program office, you had to spend money to deliver product (NAVYHQ).

Significant findings for interview question 3c

Interview Question 3c is: How do disadvantages of OTs impact use of OTs in other DoD organizations? Of the 20 organization participants interviewed:

- 5 of 20 (25%) OT disadvantages impacts on OT experience in other DoD organizations.
- 5 of 20 (25%) OT disadvantages impacts on OT negotiation and administration in other DoD organizations.
- 14 of 20 (70%) OT disadvantages impacts on culture in other DoD organizations.

Appendix AA provides more information on the factors discussed by participants for this interview question. The significant findings for Interview Question 3c are:

There is resistance to change [OTs] by contracting officers, program managers, and organization leadership. Procurement professionals and program managers fear losing control of procurement processes and giving up their turf. Some DoD organizations have rigid leadership that punishes procurement failures and mistakes, for instance, by holding back the careers of employees that are involved in mistakes. The audit-prone and risk-intolerant culture of DoD discourages DoD employees from trying OTs. The stigma OTs got from the Army's failed FCS program continues to impact the use of OTs by DoD organizations.

The majority of participants (14 of 20) discussed OT disadvantages impacts on culture in other DoD organizations. One disadvantage is related to the OT statute itself. A participant noted that not all organizations in DoD had delegated OT authority: “OT authority has to be delegated, and not all DoD organizations have been delegated this authority” (DARPA2). Thus, DoD organizations may either not know about OTs or know about OTs and have been unable to get OT authority delegated to them by their chain of command.

Another participant discussed the scarcity of OT guidelines, templates, and best practices: “Lack of sharing of best practices perhaps a lack of clear guidelines with examples . . . I think that helps when you've got pre-drafted templates that people can go to” (AFRL). Participants also discussed how hastily or poorly crafted OT terms and conditions can harm the government. Such terms and conditions may lead what one participant characterized as “abuses” that can erode public trust in the procurement system.

There may be a significant concern that there may be a lot of abuses . . . The use of OT in situations where a FAR-based contract should be used. That the terms of OT favor contractors without any justification. Terms that harm the government's interest. If not handled properly, an OT may expose the government to a lot of legal risks; could potentially erode public trust. I can see there are concerns about procurement integrity in that way (DARPA1).

Another participant discussed terms and conditions from the viewpoint of getting comfortable with not having the same amount of pre-award information the government gets in a traditional procurement agreement, for instance, cost or pricing data.

So, you have to get comfortable with the fact that you aren't going to get the cost or pricing in the way that you're used to it all of the FAR, you just have to get your head in the right place and put that in the right place in terms of risk and reward (DARPA4).

Several other participants stressed that resistance to change in DoD organizations is a cultural barrier to OTs being used more widely. For example, one participant noted that things might change in the future, but up until now there has not been not much change that has resulted in wider use of OTs: "I think it's going to change over time, but right now today, that is not the immediate thought as to how you use an OT" (NSC). The following remarks illustrate how other participants saw resistance to change manifested in their organization.

We went for a really long time, from the time we started . . . Until the time we got to the DOTC [OTs] . . . The initial reaction to our folks that were presenting these options to folks within the DoD was, that's my job. You guys are trying to take on inherently governmental work. Or, I'm the program manager. These are my duties. The OTA's very risky. There was bad press about it . . . It wasn't until . . . We started having the ammunition to dispel some of those myths about the model that were holding it back within the DoD. But we're still coming across people every day, senior folks within the Navy, even in the Army still. You know, I've never even heard of this thing [OTs]. What are you talking about? They're like flabbergasted that this thing even exists. I think it's always going to be a thing that we're going to have to continue to educate folks on (DOTC).

I think throughout the Navy; we don't use it [OTs]. Our labs don't use them very often. It's like this unknown. My perspective is I feel like the contracting officers don't know enough and therefore are stuck in their way of doing business, maybe because they don't see the advantages either, or maybe it's a control thing that there's less control . . . The contracting stuff's going off site, so that always is a concern (NAVYHQ).

There are entrenched bureaucracies that have stakeholders that want to protect their stakes and sometimes an OT will bypass that. I think there's a lot of infrastructure in place on bigger organizations . . . I think the bureaucracies in place are there, and the stakeholders just don't want to give that up, and sometimes with an OT . . . They lose their turf (DARPA3).

A related theme was the lack of training, education, and general knowledge about OTs across DoD organizations. A participant summed up this theme by observing that OTs are viewed as a last resort at some DoD organizations and are only used when a traditional procurement will not meet the requirement.

OTs are maybe looked at as a last resort. I think when companies or when organizations are looking at okay, how do we want to structure our relationship with the company on this effort, they don't look at it like all else equal, is this better as a procurement contract or better as an OT? It's can we do this at all as a FAR contract, and if so, do that, and if not, then consider an OT approach. I think for more traditional contracting units . . . It's probably the decision tree is do it as a FAR contract. If it's absolutely impossible to do it as a FAR contract, consider an OT. I think that probably would contribute to the limited use of OTs in the Air Force and DoD more broadly (AFHQ).

Another potential problem discussed by participants is that the different segments of the procurement and requirements communities are not structured to communicate with each other. One participant discussed this problem in terms of lack of communication and lack of training for OTs.

There is no formal connection between the requirements community and the procurement community and traditional procurement agreements. This causes a disconnect since they can't talk to each other. So, the only thing that people really know is the Federal Acquisition Regulations. It's [OTs] not a tool in a toolbox right now, so when looking at acquisition opportunities, they're not reaching, hey, let's look at this, let's pull out the OT and tailor it for this particular requirement. It's just not what the contracting community is comfortable with doing (NSC).

Another participant discussed cultural resistance to OTs arising from lack of education about OTs across DoD.

I don't think that right now, because there isn't really a lot of education out there, what we put out, we try to give everyone, hey, this is the potential for pitfalls; here are the good things that the OT brings in. I think right now; everyone is being very cautious. I don't think it prevents anyone from using it. I do know the only thing that really prevents people from using the OT is lack of education. I think the more people that know about it, the more that they will use it (DTRA).

A DARPA participant discussed the general lack of understanding and knowledge about OTs includes OTs not being advertised or advocated to DoD program managers—no one has taught them the nuts and bolts of their benefits and how to use them.

I don't know that program managers really know that this [OTs] is an option. Unless someone goes and advertises, there's a lack of advertising . . . To even know about OTs, let alone how do you do one, let alone what are the benefits? How do you set it up? There are all kinds of uncertainties when you're dealing with OTs. For organizations that have no advocate or understanding of it, I would say that it would be way more challenging for those kinds of organizations (DARPA2).

The same participant discussed lack of OT templates and a general fear of the unknown.

I think that there's a lack of understanding about OTs. I think . . . Contracting officers are kind of fearful of OTs because it's easier to do what you know . . . We are taught and trained to know the FAR and the DFARS and to operate within those parameters. When all of a sudden you are given this alternative, which sounds amazing, but there are no templates . . . Everything's a blank sheet of paper . . . It can be daunting. I would say for people who have never done one to actually do one . . . I think you're hard-pressed to get contracting professionals to embrace [OTs], let alone program managers (DARPA2).

Participants discussed the DoD cultural impact of the disadvantages of OTs from the vantage of DoD employees being fearful of trying something new like OTs. One participant explained how this fear originates from rigid upper management and its punitive approach to procurement mistakes.

I think it's the fear of . . . Ignoring the lessons learned very hard in the past. I think in other organizations . . . I think there's much more rigid enforcement by management . . . A lot of it is the fear of audit factor . . . I've had a lot of experience in major weapons systems, and you do get a lot of people looking over your shoulder, that don't understand what you're doing. It's much easier to say, why did you do that? Well, because FAR 6.203-9 requires me to do that, rather than give them your thought-out reasoning that you might have deviated from FAR Part 6 in your OT. They don't understand that (DARPA3).

Following this theme, another participant discussed how the audit and risk-averse culture of DoD chills wider use of OTs.

We have to change that audit and risk culture around DoD procurement if we are going to effectively use OTs. Need to give their people cover, to say, yes, it is okay to go do things differently, and it is okay to fail. If you don't have that, then you're not going to be able to leverage OTs effectively (DIUX).

A DARPA participant discussed how he thought OTs were negatively viewed in other DoD organizations.

I think if they come from a place, a traditional agency . . . I think that one thing they see is a disadvantage right now is I've got to learn something new. I've got to figure my way out. This [OTs] is only one of 20 things I've got to do. I just would really . . . Like to shelve it back over to a contract . . . It's [OTs] an unnatural thing. So, takes a while. It's this one-off thing that's usually a tiny part of your workload, and you don't know what you're doing. There isn't real firm training out there, right? So, you're left on your own . . . Trying to figure out . . . OTs will likely never be a big piece of what they . . . So, because it does take a lot of brainpower [of] Procuring Contracting Officers (PCOs), PMs, legal to focus on those [OTs] negotiations, right? That's a spike is never going to go away. You just got to keep it shifting it to the right, out of fear. Get past the spike, right? Just train, do them [OTs], build up a level of confidence and sort of precedence on how you do things, and then and do and use them correctly, right? Don't use them [OTs] to get out of a bad spot to avoid something else, right? Use them correctly (DARPA4).

Several participants discussed how the Army's failed FCS program from the 2005 timeframe continues to influence OTs across DoD. The following participant quotes illustrate

how the FCS experience is an ongoing source of cultural resistance to the wider use of OTs by DoD organizations.

A lot of the aversion [to OTs] comes from the FCS experience. One reason I think that we keep using traditional contracts is that when you only have a hammer, everything looks like a nail. The Federal Acquisition Regulation and its mindset are the hammer (NSC).

The other thing that discourages people is . . . Habit; bureaucratic institutions have long memories and back 15 years ago DoD got the snot knocked out of them from Senator John McCain for using an Other Transaction Agreement for the Army's Future Combat Systems. Like all DoD, the message was, oh, OTAs are bad. Don't ever use them again (OSD).

I will tell you what I always hear. Always, every General [Officer] that I brief. Well, you know we're going to use an OT, what about FCS? There is that stigma . . . I'm not sure about all the particulars but that, when I get to the General level, the one, two, three-star level, that's what I'll hear, right off the bat is, So, we're using OTs again? What about FCS? That's a big one that I often hear (PIC).

Major findings for interview question 4

Interview Question 4 is: What do participants believe explains DoD's numbers of OTs compared to traditional procurement agreements? Interview Question 4 includes three subsidiary interview questions:

- a) What factors in your organization help explain the number of OTs executed compared to traditional procurement agreements such as contracts, grants, and cooperative agreements?
- b) What DoD-wide factors help explain the numbers of OTs compared to traditional procurement agreements?

- c) What other factors help explain the numbers of OTs compared to traditional procurement agreements?

During the interviews, some participant responses to subsidiary Interview Questions 4b and 4c were redundant. Several participants noted this problem. Therefore, the researcher combines the participant responses for subsidiary Interview Questions 4b and 4c. The significant findings of subsidiary Interview Questions 4b and 4c are combined, and both are discussed below under subsidiary Interview Question 4b. The significant findings for Interview Questions 4a-b/c are:

- a) Traditional procurement agreements are appropriate for most DoD requirements. The needs of organization customers and attracting nontraditional contractors impact whether to use an OT. OT advantages such as speed to award impact whether to use an OT. OT disadvantages such as negotiation workload impact whether to use an OT. Individual OTs awarded under consortium OTs account for most DoD OTs, yet these awards are not recorded in FPDS.
- b) DoD personnel are unfamiliar with OTs. They are risk-averse to try new procurement tools such as OTs. DoD personnel are used to relying on traditional procurement policies and regulations. They fear repeating procurement mistakes from the past. There is a lack of training and guidance about OTs. OTs are harder to negotiate and have a greater risk of failure than traditional procurement agreements. There is relatively little DoD leadership support for OTs.

The significant findings for Interview Questions 4a-b/c lead to the following major findings for Interview Question 4:

Traditional procurement agreements are appropriate for most DoD requirements. OT advantages such as speed to award impact the numbers of OTs. OT disadvantages such as negotiation workload impact the numbers of OTs. DoD personnel are unfamiliar with OTs. They are risk-averse to try new procurement tools such as OTs. DoD personnel are used to relying on traditional procurement policies and regulations. There is a lack of training and policy guidance about OTs. There is relatively little DoD leadership support for OTs.

The following discussion summarizes significant findings for Interview Questions 4a-b/c.

Significant findings for interview question 4a

Interview Question 4a is: What factors in your organization help explain the number of OTs executed compared to traditional procurement agreements such as contracts, grants, and cooperative agreements? Of the 20 organization participants interviewed:

- 7 of 20 (35%) participants discussed organization experience factors potentially explaining the numbers of OTs compared to traditional procurement agreements.
- 13 of 20 (65%) participants discussed OT negotiation and administration factors potentially explaining the numbers of OTs compared to traditional procurement agreements.

- 10 of 20 (50%) participants discussed organization culture factors potentially explaining the numbers of OTs compared to traditional procurement agreements.

Appendix AA provides more information on the factors discussed by participants for this interview question. The significant findings for Interview Question 4a are

Traditional procurement agreements are appropriate for most DoD requirements. The needs of organization customers and attracting nontraditional contractors impact whether to use an OT. OT advantages such as speed to award impact the numbers of OTs. OT disadvantages such as negotiation workload effect the numbers of OTs. Individual OTs awarded under consortium OTs account for most DoD OTs, yet these awards are not recorded in FPDS.

The majority of participants (13 of 20) discussed OT negotiation and administration factors at the organization that potentially explain the numbers of OTs compared to traditional procurement agreements. Some participants discussed how many OTs are starting to be awarded by their organization.

Overall, SOCOM has awarded, I think now, a total of six. A couple of those were not your traditional way of pursuing the OT. At the onset, we were pursuing FAR-based contracts, and the way the negotiations and things were going, we recognized very quickly that we were not going to be able to get to an award with this particular company. Then we tried the OT (SOCOM).

Their numbers are small right now but will increase. And as they increase, then the number of FAR-based contracts will decrease (PEO-CBD).

A DARPA participant discussed how the great recession in 2008 reduced the number of OTs awarded by his organization.

So, up until the last year, I would say at most it [OTs] was 5 or 10% of my work with OTs. Because it had dipped to big time in 2008 when the economy kind of bottomed out . . . So, when the economy dropped, then the cost sharing money dropped, and the industry wasn't as interested right at that point. So . . . I was only getting one-off kinds of OTs where there really wasn't a lot of any sharing involved . . . Now in the last year, right, big push by DoD and DARPA for nontraditionals, to attract commercial companies . . . And OTs, they've jumped huge. So now, there are probably 30% [of my work] (DARPA4).

Several other participants talked about consortium OTs and how they impact the relative numbers of OTs compared to traditional procurement agreements. One participant observed that all consortium OTs must have a senior leader as an advocate to help get the OT started. "They all have to start out with that champion" (TARDEC). Once a consortium OT is established, however, it can generate a significant number of OT awards to the consortium members. One participant described how the DOTC consortium OT accounts for a large share of the overall DoD OT projects. She discussed how this could result in misleading data about the numbers of OTs compared to traditional procurement agreements because there is only the overarching consortium OT recorded as the award in FPDS.

There's only one [DOTC] Other Transaction Agreement between the government and the consortium. And so, in terms of numbers of OTs, one could argue, well, there's only one DOTC OT. When in reality, we've made 800 awards over the last eight or nine years that we've been involved. But if you were to go into a procurement system [FPDS], you would only see the one prime mod (modification), and whatever mods happen to the prime mods. So, in the actual, you don't get visibility of the 800 [OT] project awards that were made . . . I think, in some respect, it might be very artificially low if one were to just look at the number of OTs . . . You can't go into any government procurement system and see all of that activity (DOTC).

Other participants explained how the needs of different parties, such as the OT contractor and DoD customers, impact the numbers of OTs awarded by their organization. For instance, an Air Force participant discussed that his organization considers the needs of the end user when deciding whether to award an OT.

Who is it for? At AFRL, it's not necessarily always for an Air Force need specifically. We've got other organizations that kind of use our contracting in our R&D efforts and so we've got to know what our consumer or end user needs out of this contract and based upon that, tailor it. Multiple parties are sometimes involved in these contracts and when we're selecting the tools to use, say even if we do an OT, we've got to make sure that the other party involved is okay with that tool or is advantageous toward what their need is (AFRL).

Another participant discussed how customers, in this case other DoD organizations that his organization supports, are factors in deciding whether to use an OT instead of a traditional procurement agreement.

I think probably the main consideration is going to be obviously if our client, you know, wants to continue to push OTs as a type of agreement that they would like to see us use for certain types of non-government entities. That would contribute to whether or not we'd like to use those in the future (SPAWAR).

The same participant discussed the choice to use an OT from the perspective of the contractor.

Are we dealing with an entity that's totally new in working with the government or have they worked with the government before and they're just trying to get around some of the requirements of cooperative agreements or grants and so they think that they want to just do an OT because it might be easier for them? So, we may be swayed if it's traditional or you know, traditional contractor, somebody who has kind of been doing business with the government, then we maybe feel like we can lure them back into the contract or public agreement realm as opposed to going the OT route (SPAWAR).

From another perspective, a DARPA participant discussed how the decision to award OTs depends on the needs of contractors that would otherwise be reluctant to work with the government.

We just want to make sure that in those research areas where we are fairly confident that there's a whole group of potential performers and that don't want to play with us that we might be interested that we're willing to use the instrument type when is available to us (DARPA4).

Several participants discussed specific advantages of OTs that impact the numbers of OTs compared to traditional procurement agreements. Speed of award was one factor under this theme. “[OTs] have faster award times of 120 days or less. In my 36 years working . . . On dozens of contracts actions. The normal time to award I have experienced was 18-24 months” (TARDEC). Another participant observed, “The problem with the (traditional procurement) acquisitions that we were encountering was that it was taking over a year to execute a contract. And so, we were really looking for a vehicle to expedite acquisition” (DTRA). Related to speed is the practical consideration of whether there is a traditional procurement agreement in place that can cover the work.

The factors are being their existing military system that already has a contract, or are we having to start from scratch? If we're having to begin, initiate our own . . . I would like to use them [OTs] more. I'm limited because I'm using now, Washington Headquarters Services (WHS). I have also reached out to Army. There are limitations on one, their knowledge, and the number of people that they can support (SCO).

Also related to speed, one participant talked about how the added workload associated with OTs impacts the numbers of OT awarded by his organization.

It's been great but doing a lot of them [OTs] at one time can be a bit challenging, right? Because it's a bandwidth issue. Because each one does take time to work through. So, when you're trying to do a lot of them at one time . . . It's a workload thing. It could possibly get in the way of the other traditional stuff you're doing is suffering because you have to put so much time and effort into work each one of those things [OTs], and that's where I am right now (DARPA4).

Another theme impacting the numbers of OTs was attracting nontraditional contractors to work with the organization.

The value they [DoD organizations] can get from nontraditionals. How do we help them match-make and come up with something new and innovative? I mean, at the end of the day, the model [OTs] is to help drive innovation (DOTC).

I think it's primarily just the nature of the research. Each project is different. So, there's a place where there's more use, proper use for OTs in some instances and sometimes they're just not . . . The net is always cast wide in case there's somebody out there that even the program manager's not aware of on the nontraditional side. But there are some programs where you know who your players are, and you can throw that wide, that net as wide as you want (DARPA4).

Another participant discussed how collaboratively working with contractors to develop statements of work has increased the number of OT awarded by her organization.

Rather than putting out a Request for Proposals (RFP) or developing the statement of work that is part of the government, we solicit for a problem that is usually about a paragraph or so long, not more. Once we have selected the companies we want to work with, we actually design and write the statement of work together with the company and the customer . . . So, the flexibilities that OTs allow you to set up . . . These individual and unique processes to set your in particular mission is really helpful (DIUX).

Participants discussed that there are limits to the desire to attract nontraditional contractors to work with the government. One such limit can be where the contractor is

inflexible or unwilling to negotiate with the government. A DARPA participant discussed this theme in the context of how much the contractor understands the limits of the OT process.

Understanding of OTs, their understanding of the limits of OTs. They don't view an OT as a commercial transaction, which they can negotiate 100%. There are certain things you just cannot negotiate, but there are a lot of things where the government is flexible, such as intellectual property (IP) rights. They should take advantage of that instead of getting meticulous about something that government cannot change . . . In one situation, we almost had to cancel a negotiation because we spent months negotiating the definition of a subject invention (DARPA1).

An added participant discussed how efficiency factors related to the traditional procurement system weigh in favor of more traditional procurement agreement being awarded by his organization.

I think it's probably that the FAR system is really set up for volume where it's written to cover the vast majority of the types of things that DoD organizations want to enter into agreements with organizations to do, and so I think it gets most of what needs to be purchased. The FAR is written to accommodate that. I think OTs are really useful for edge cases and some situations where the broader mainline contracting approach just isn't well suited (AFHQ).

Significant findings for interview questions 4b-c

Interview Question 4b is: What DoD-wide factors help explain the numbers of OTs compared to traditional procurement agreements? Of the 20 organization participants interviewed:

- 3 of 20 (15%) participants discussed DoD experience factors potentially explaining the numbers of OTs compared to traditional procurement agreements.

- 13 of 20 (65%) participants discussed OT negotiation and administration factors potentially explaining the numbers of OTs compared to traditional procurement agreements.
- 19 of 20 (95%) participants discussed DoD culture factors potentially explaining the numbers of OTs compared to traditional procurement agreements.

Appendix AA provides more information on the factors discussed by participants for this interview question. The significant findings for interview question 4b-c are:

DoD personnel are unfamiliar with OTs. They are risk-averse to try new procurement tools such as OTs. DoD personnel are used to relying on traditional procurement policies and regulations. They fear repeating procurement mistakes from the past. There is a lack of training and guidance about OTs. OTs are harder to negotiate and have a higher risk of failure than traditional procurement agreements. There is relatively little DoD leadership support for OTs.

The overwhelming majority of participants (95%) discussed DoD culture factors that potentially explain the numbers of OTs compared to traditional procurement agreements. One theme that participants addressed was skepticism about using OTs because OTs represent an unknown compared to traditional procurement agreements. The following quotes illustrate participant remarks under this theme.

Unknown of the OTAs. What is this thing? Is it some unique trend, flavor of the day? I was skeptical, at first, too. I think a lot of people are skeptical (TARDEC). When I was at [the] Defense Information Systems Agency (DISA), I wasn't aware of the existence of OT at all, partly because the mission of DISA was not too much into R&D,

even though it does have a lot of R&D. They were all done through a FAR-based contract. Could any of those have been done through an OT? Maybe, but because of the lack of the knowledge and experience, it was not used (DARPA1).

But as far as contracts out there, when I was at ONR, I never had heard of using them [OTs]. We would do the Broad Area Announcement (BAA). End of story (SCO).

Another participant elaborated on why OTs continue to be unknown across DoD.

I think [it's] still knowledge. People don't understand OTAs a lot, and they're still used to the traditional approach. But there are some places out there that do it. It seems like it's been catching on for the last couple years. Some organizations I know are just trying to do straight OTAs period because a lot of these high-tech companies don't want to do contracts with DoD . . . You would be surprised at these little small companies that just don't want to do contracts with the government. Even some of the larger companies, they just don't want anything to do with government contracts. No matter how much money you throw at them (MDA).

A participant expressed her surprise that she continues to come across senior DoD employees that have not heard of OTs.

But we're still coming across people every day, senior folks within the Navy, even in the Army still. You know, I've never even heard of this thing. What are you talking about? You know, they're like flabbergasted that this thing [OTs] even exists. I think it's always going to be a thing that we're going to have to continue to educate folks on (DOTC).

Other participants discussed that progress has been made on OT training, but that OTs are still unfamiliar in many parts of DoD.

I think we had somebody come out a couple of months ago and brief our contracts folks on OTs and potentially when to use them, why to use them, that sort of thing. But outside of that, I'm not sure what the other Military Departments—Army or Air Force—you know if there's anything really driving us one way or the other to use them or not use

them. I'm not sure exactly . . . If there's any new proposed legislation or any new regulations or instructions (SPAWAR).

I think there are pockets of organizations within DoD that use it and use it [OTs] well, like DARPA and NASA, but I don't think the acquisition community as a whole have talked much about it. As a result, the community is not educated on it, and we certainly have not taken full advantage of this tool (SOCOM).

A participant expressed hope on dispelling the unknowns about OT based on the number of mentions of prototyping in recent NDAA's.

There are 77 mentions of prototyping in the NDAA in '17, and then '16 was like, 33. Then in '15 and years before, it was less than ten. I think OTAs will grow as long as there's more education on what they mean because it's an unknown (NAVYHQ)

Another related theme was the relative lack of leadership support for OTs and the associated risk aversion of DoD organizations and employees to try new procurement tools. Several participants discussed the reluctance of employees to try something new such as OTs.

I think because we've grown up in a FAR-based community, there's reluctance to try something new and if we're not educated on the new, not many will pursue (SOCOM).

We have to change that audit and risk culture around DoD procurement if we are going to effectively use OTs . . . Contracting officers are incentivized not to take risks, as opposed to take risks. So that defaults you into thinking in not an OT approach (DIUX).

The institutional reluctance to use OTs may be traced to the fact that R&D projects have a greater risk of failure than traditional procurement agreements. A participant summed up this theme:

Here's the thing is that in R&D, a lot of things are going to fail. Not every project is going to be a home run or technology that transitions to for any kind of military capability; we don't know. In fact, many projects fail. It might not necessarily be due to an OT arrangement; it just might be an idea that was never going, you do learn something from failure. Even if it failed, it might force you in a different direction, the program manager in a different direction . . . Even in failure, there are still things that are learned. It wasn't a complete failure (DARPA2).

Another participant discussed how the reluctance to try to new things could be traced to DoD leadership.

I would say leadership, and I'm very definitive on this . . . It's hard to get line managers who are willing to allow their teams to fail. That's a piece where I haven't really seen, the DoD's got to, because sitting where I am right now, the DoD has a lot of processes in place, and when you stray away from those processes, I think people feel like they have a control and there's no, nothing is changed in terms of you have 100 different rules and if you got rid of 95 of them, things are going to go wrong. But there's been no allowances for that (DPAP).

Other participants related the reluctance to try new things such as OTs to the fear of repeating past procurement mistakes and the persistence of entrenched bureaucracy.

My guess is the parallel world of DoD 5000 [program acquisition management regulations] almost requires you to, I think there's again the culture of trying to avoid making the same mistake over and over again that is memorialized in DoD 5000 drives a lot of the culture away from OTs (DARPA3).

I went to a meeting about three or four months ago about a consortium, and I forgot who it was with, but it's the same thing, because Missile Defense Agency (MDA) does not have that discipline, so we're trying to turn to organizations and Military Interdepartmental Purchase Request (MIPR) money to them to do the same thing, the consortium and the timeline, instead of trying to set up our own. It's just that difficult to work within our bureaucracy (MDA).

But some participants expressed optimism about recent institutional changes in DoD that are resulting in more OTs being awarded.

I've seen a big change in the Army, in senior leadership in the Army, as far as comfort level with OTs, for the good. And that's been over the last couple years I would say, has been a bigger push with let's consider OTs in our programs of record and that kind of thing, which we didn't typically see before (PIC).

There has been a slight shift recently. OT seems to be the new buzzword and some in senior leadership are a proponent; thus, we are hearing about it more. We're beginning to talk about OTs, and we're experimenting with them. In my experience at the commands I have supported, this [OTs] is a new topic of discussion, even though it's not new (SOCOM).

I believe with the acquisition reform and the real push in innovation. We even see that with DoD, with this just organization-wise, we're splitting AT&L. USD(AT&L) is being cut into to two separate offices; one for R&E, research, and engineering, and one for acquisition. I think we're going to be pressed to find how do we do innovation, push technology, OTAs, or the start of that . . . I believe that it's going to get more exposure leadership even at the Secretary [of Defense] level. They're pushing to move things faster . . . OTAs might enhance that speed at least to prototyping . . . Even at the congressional level . . . prototyping is the buzzword (NAVYHQ).

The new Chief of Staff of the Army, he's not waiting. He's not tolerating seven-year acquisition programs anymore. He came in; he wants to make a mark on his watch (TARDEC).

Another cultural theme was that established processes for traditional procurement agreements and the comfort level these methods give to DoD employees. For example, several participants discussed how the FAR offers familiar regulations that prescribe procedures for traditional procurement agreements.

If they're going to do a FAR contract, that's the default, and no one's going to question, well, why did you use the FAR to award an agreement? Whereas with an OT, you're perhaps in some ways going out on a limb (AFHQ).

I think it's probably that the FAR system is really set up for volume where it's written to cover the vast majority of the types of things that DoD organizations want to enter into agreements with organizations to do, and so I think it gets most of what needs to be purchased. The FAR is written to accommodate that. I think OTs are really useful for edge cases and some situations where the broader mainline contracting approach just isn't well suited (AFHQ).

In the FAR, everything is prescribed, you've got that whole host of . . . Statutorily driven requirements in addition to all the regulatory requirements and those are all administered and overseen by the contracting community. The PM doesn't get involved in that, and I think we've only given real lip service to tailoring the requirements that are quite possible with many aspects of FAR-based contracting (NSC).

We have regulations built around the traditional contracting method . . . We've got policies and regulations that solely focus on traditional methods. Our business is based upon the FAR and the DFARS and the various supplements. There's very little out there as it relates to OT. We've got the DoD [OT] Guide, but there's not much regulation around OTs, and probably for good reason . . . It makes sense that across the board, there's more traditional procurement contracts in place rather than OTs because that's how we're educated. We're training our workforce, beginning with interns on up on the traditional FAR contracting methods (SOCOM).

Several other participants discussed this theme in broader terms, relating the lack of familiarity about OTs to the program and requirements communities and risk aversion to trying a new procurement process that lacks the guidance to help these parts of the DoD procurement community develop statements of work and documentation required to award OTs.

Not only do we have a contracting workforce that isn't very deep regarding their familiarity and their experience and expertise in using Other Transaction Agreements, but within the workforce that the OTA is going to be serving, they've never heard what an OTA is. All of those scientists and engineers who are the ones who are going to build the procurement packages for securing services to develop prototypes, most of them have never heard of an Other Transaction Agreement (OSD).

I could see their being maybe a risk aversion to using an OT approach in the absence of a more robust guidance framework that could be relied upon by people to say, here are all the guidance on how we should be using OTs and how this particular one is exactly where an OT should perhaps be preferred. There is guidance from DPAP, and it even just recently updated OT Guide. I think that's helpful, but still, there's not the same level of guidance. That's just the tip of the iceberg compared to the type of guidance and institutional support for letting a FAR contract (AFHQ).

Another participant discussed established DoD requirements processes as a potential factor that impacts the numbers of OTs awarded by DoD organizations.

One of the biggest problems with acquisition in this Department, not just contracting, is that we stovepipe things so much between requirements contracting and acquisition. You've got the Joint Capabilities Integration Development System (JCIDS) requirements process that is operated behind the wall, that the acquisition doesn't get much insight into. You got the acquisition process that operates a certain way that the operators don't have much say in. And thanks to the contracting process, the beauty about OTs is not only can it help you break down communication barriers between the government and the companies, but also within the government as well (DIUX).

I would say again it also goes back to our requirements process, right? Where our overall acquisition process is set up in such a way that it doesn't allow for the agile adaptation or use of different types of procurement. It's set up to go look at one specific solution defined by the government beforehand. Which in my mind, is not that flexible, so sure, you might be able to do it faster doing OT, but it is not the same as allowing the industry to help come up with what that solution is (DIUX).

An added participant discussed the leadership structure of the Pentagon and the continuity dichotomy between political appointees and career civilian employees.

We are a civilian-run defense department of political appointees. They turn over with great frequency. Our senior military leaders turn over with great frequency. Successful industries could never operate the way the defense department operates. There's no constancy of purpose and continuity because of the turnover. The career civilians . . . End up being in positions for a long time can make a difference, but they are always subject to the whims of the leadership coming in with each administration . . . It's very, very difficult to get a good idea and then sustain that good idea over time because your

leadership changes so much . . . The disadvantage is that our organizational structure is so fluid, depending on administrations and then even the turnover of the military that you're not in a position to take good ideas and continue them over time . . . Specific to an Other Transaction, whether it's applied on a project-by-project basis, or with consortia, you just don't have the power base that says, hey, we're going to start using this thing [OTs] that's going to be a default (NSC).

Still another participant discussed how traditional contractors could impact the ability of DoD organizations to use OTs. Contractors have bureaucratic processes that bias them towards using traditional procurement agreements.

They [DoD leaders] just want to be able to tap into a group of performers that are just not the ones we traditionally do, right? There's just this mindset that traditional guys are sometimes like the government. They're just big slow elephants. They don't think outside the box anymore. They think too much like the government. We aren't going to get that really great next idea, no matter where it is in the research perspective (DARPA4).

Participants discussed how the lack of training about OTs, ignorance of OTs, and risk aversion, combined to impact the numbers of OTs awarded by DoD organizations. Lack of training about OTs was a theme discussed by several participants. The following quotes illustrate participant remarks under this theme.

I would say that there's not a ton of guidance, I think, that can be relied on, and so I think may be an additional burden to just the expertise required to competently draft and award an OT. I could see there being institutional barriers to using an OT where maybe leadership within organizations are unsure of the rules surrounding OTs or just aren't confident how it'll be received maybe politically within the organization, that it's maybe seen as something unusual and something that they would be maybe called upon to justify just at the outset (AFHQ).

If training was made available to everyone, both in terms of the acquisition and program management community, as well as the contracting community, if it became mandatory training for everyone, I mean that doesn't solve the problem, but now you start to educate,

and people start to understand that there is a tool [OTs] that is out there that can do what they need and probably even more (NSC).

I think OT numbers are relatively low I think DoD-wide. And so, I would go back to I think it's the lack of kind of knowledge, experience, and guidelines. So, knowledge, I would say it's not very well known as a tool to be used. Experience, it's difficult to find those experienced contracting officers who are willing to, if they already have established methods of getting stuff done, are willing to go off that beaten path and try something new and have that level of experience to be able to do it. And then, guidelines, I think it would be ideal to have template versions [of OTs] that the contracting officer can pull from. And even legal to look through and say these are the terms they traditionally like to see in this section or here is an ideal OT that we can build upon (AFRL).

However, other participants discussed that they have recently seen more training and guidance about OTs.

One thing that has helped is the latest revision to the guidance [DoD OT Guide], is that it's easier to go from a prototype project into production (PEO-CBD).

My husband just came back from the group commander's course, and when he was sitting through that course, he did talk about this acquisition team that was briefing senior leaders about the way we are transitioning acquisition in general. And one of them that they had covered was Other Transaction authority (DTRA).

Other participants discussed inherent shortcomings of OTs themselves as a cultural factor that could explain their relative numbers compared to traditional procurement agreements. For instance, not all DoD organizations have OT authority, and the OT process concentrates power in the hands of one individual, the agreements officer. OTs require more innovative thinking and additional time to negotiate than traditional procurement agreements. Participant remarks under this theme included:

I think it goes back to who has the authority to execute. Because not every organization or agency within DoD has the authority, right? So, you have to be doing research and development and prototyping requiring some sort of prototype. If your acquisition is outside that, then you would not sit within the rules of the OT authority. So, it stems from that, number one. And number two, it is lack of education. If you do have the OT authority to execute one, its lack of education and even misinformation from the previous OT authority guidelines (DTRA).

You can't just be very narrowly tailored to the FAR and DFARS. It also includes, in order to benefit from it at the highest level, you have to really think out of the box. So, the disadvantage of it as far as using OTs is that it puts a lot of power, concentrates a lot of power into an agreements officer, and you can't just grow an agreements officer . . . That's the reason why, I don't foresee OTs being widely adopted, just because you have to be a renaissance thinker (DPAP).

It's the level of effort. I don't think the PM community really wants to think through it [OTs] and then put the level of effort necessary to properly tailor it to meet their needs, even given the statutory and regulatory requirements. Whereas, you turn around and say, let's do an Other Transaction; all of a sudden, they think, oh, its hands-off, it's going to be magic, I'm going to get white papers from these guys, and whether they're five pages or 15 pages, I'm going to read them and make a decision. The level of effort is minuscule compared to the voluminous proposals and requirements that are associated with FAR-based contracting (NSC).

Major findings for interview question 5

Interview Question 5 is: What do participants believe are factors that could be changed to impact DoD use of OTs? Interview Question 5 includes three subsidiary interview questions:

- a) What factors in your organization could be changed to impact use of OTs?
- b) What DoD-wide factors could be changed to impact use of OTs?
- c) What factors do you believe are resistant to change, but if changed, would impact the use of OTs?

The significant findings for interview questions 5a-c are:

- a) For OTs to succeed, organization personnel must adopt new ways of thinking. Leadership should communicate the benefits of OTs to organization personnel to persuade them to try OTs. Additional guidance, sample clauses, and higher dollar levels of delegated OT authority will positively impact use of OTs by DoD organizations. Putting more trust in the judgment of agreements officers will positively impact the use of OTs by DoD organization. Active leadership support for OTs will positively impact use of OTs by DoD organizations.
- b) Leadership should trust the judgment of agreements officers on OTs. DoD personnel should not suffer adverse career consequences just because an OT failed. Leadership should actively and publicly support OTs. OT templates, sample clauses, an online knowledge management tools should be provided to help DoD organizations more effectively use OTs. Fiscal policy should be changed to broaden the types of appropriated funds that can be used for OTs. A method for quantifying the benefits of OTs should be developed. The one-third cost share requirement for traditional contractors should be eliminated because it deters traditional contractors from using OTs.
- c) Institutional inertia causes DoD personnel and organizations to continue to use TPAs instead of OTs. Leadership must be actively involved in breaking institutional resistance to change that arises from habitual reliance on TPAs and employee risk aversion to trying new procurement tools such as OTs. Leadership should implement procurement policies and provide training and knowledge management that encourage and support the use of OTs.

The significant findings for Interview Questions 5a-c lead to the following major findings for Interview Question 5:

Institutional inertia, employee habit, and risk aversion cause DoD organizations and personnel to continue to rely on TPAs instead of OTs. Leadership must become actively involved in publicly supporting OTs and in encouraging DoD organizations to use OTs. Additional guidance, OT templates, sample clauses, and knowledge management tools must be provided to help DoD organizations and personnel more effectively use OTs. DoD organizations and personnel should be given additional authority and independence to use OTs and not suffer adverse career consequences just because an OT fails.

The following discussion summarizes significant findings for Interview Questions 5a-c.

Significant findings for interview question 5a

Interview Question 5a is: What factors in your organization could be changed to impact use of OTs? Of the 20 participants interviewed:

- 3 of 20 (15%) participants discussed employee factors that could be changed to potentially impact organization use of OTs.
- 11 of 20 (55%) participants discussed leadership and oversight factors that could be changed to potentially impact organization use of OTs.

- 10 of 20 (50%) participants discussed training and communication factors that could be changed to potentially impact organization use of OTs.

Appendix AA provides more information on the factors discussed by participants for this interview question. The significant findings for Interview Question 5a are:

For OTs to succeed, organization personnel must adopt new ways of thinking. Leadership should communicate the benefits of OTs to organization personnel to persuade them to try OTs. Additional guidance, sample clauses, and higher dollar levels of delegated OT authority will positively impact the use of OTs by DoD organizations. Putting more trust in the judgment of agreements officers will positively impact the use of OTs by DoD organization. Active leadership support for OTs will positively impact the use of OTs by DoD organizations.

The majority of participants (11 of 20) discussed leadership and oversight factors that could be changed to potentially impact organization use of OTs. A general theme that participants discussed was the need for new ways of thinking about using OTs. One participant, for example, observed: “I’m a proponent of OTs when it makes sense to do it. It can’t be the answer to every acquisition strategy, but maybe it’s the right answer to some” (SOCOM). Another participant discussed this theme in terms of a need to communicate organizational experience with OTs to others.

But then the other part of it is sort of that organizational experience that to say hey, look, we’ve actually done this before, and you know, here are some people that you might be able to talk to if you’re interested in potentially entering into an OT agreement (SPAWAR).

Other participants discussed new ways of thinking as recognizing the need for new procurement tools and to stop thinking the old way about procurement.

We need more [procurement] tools in our tool bag . . . Stop thinking the old way. We'll work the traditional way to the short term, but start looking at this long term, and set this up. The route you really want to go down is the OTA prototype development because it actually fits everything that we're doing. I think that's kind of influencing change, and people are asking about it now (MDA).

An added participant emphasized the need to convince contracting and legal employees of the benefits of new ways of thinking about procurement. The participant discussed the need to replicate the OT processes of the Army Contracting Command (ACC), Picatinny Arsenal, which is a recognized center of excellence in the DoD OT program.

So how do we replicate what ACC, New Jersey, has built in other acquisition commands around, not even just the Army, but through other services, and develop those people who know and are comfortable with how to execute these things? One of the reasons why we've always been challenged in selling the [OTs] model to others is . . . It's easy to convince the program person . . . But if you can't convince the contracting and the legal people that it's okay . . . If you're not going to get yeses from them, you might as well forget about talking to the program person (DOTC).

Another leadership theme that participants discussed was the need for more policy guidance. For instance, one participant bluntly stated that what needed to be changed was the issuance of a “directive stating to leverage an OTA before a FAR-based contract” (TARDEC). Similarly, another participant discussed the need for delegating higher dollar thresholds of OT authority to DoD organizations.

So, we only had [OTs] authority for \$5 million . . . Which was coming through WHS . . . (USD)AT&L has the authority, but . . . The authority was not given down to us . . . It was not delegated, so we actually went back to DCMO (DoD Deputy Chief Management Officer) and said, we need the authority for up to a \$250 million. So, we received that authority to do it. That would've been the other thing is . . . \$5 million . . . That doesn't get me anything. I need the authority that (USD)AT&L has. So, the authorities to be able to use them, perhaps these other organizations don't have that authority (SCO).

Some participants cautioned that more guidance—for instance, new policies, procedures or sample clauses—would diminish the flexibility of DoD organizations and contracting officers to draft OTs. One participant, for example, stressed the need to put more trust in the judgment of contracting officers rather than issuing more policies and procedures.

I think currently there's a move to put more policies and procedures in place that I think is undermining the independence of the contracting officers. I think just trusting. I think we need to foster a stronger element of trust of the contracting officers' judgment to make the right thing (DARPA3).

But another participant pointed to the need for additional guidance, noting that it might be possible to issue more policies and guidance without overly limiting OTs.

I think people are probably concerned that if you start drafting sample clauses, even if it's just suggestions, and it's not binding guidance, that that will over time define the outer limits of what can be done with an OT, and it will lose that ability to be used in the cases where the most extreme amount of flexibility is necessary . . . I think it probably would be possible to offer organizations more guidance and support in a way that is less likely to evolve into mandatory guidance and . . . Circumscribe what can be done with an OT in sample clauses (AFHQ).

Participants discussed the need for leadership support for OTs, both at the organization and DoD level. One participant, for instance, tied leadership support to more education about OTs.

Change will only be realized if senior leadership is behind it. Success is possible when people are educated on the topic. The training tools must be in place and implemented for OTs to take flight because you don't know what you don't know (SOCOM).

Following this theme, another participant discussed the importance of leadership in getting the word to DoD organizations out about the benefits of OTs.

People can say all the things in the world . . . I see training, and I'm like, basically we're too busy to take extra courses . . . I really would say that coming down from senior leadership, it's about getting the word out and visibility out. I think the OT workshop that they had in the fall [of 2016] was great, but that was by invitation only from what I understand. But having things like that throughout different organizations, whether its Army-centric, it's Service-centric and then DoD-wide, they make a lot of sense (PIC).

Several other participants discussed the beneficial impact that leadership support for OTs has had on using OTs in their organization.

With [new leadership] now at the helm, the very first all-hands . . . He talks to his people; he talked about DIUx and the speed of acquisition, and that there's this other transaction authority that we need to tap into . . . I think with the new leadership being very supportive of using novel ways to execute different acquisitions, more education on grooming the worker bees that are doing this (DTRA).

I don't think there are any barriers in this agency to using them. We have the skills set. We have the training. We have the advantage that we always have people that are in the mill that have had years of experience. So, we learn from each other, and we have a GC staff that knows and understands them and can help us out of a pickle we're negotiating. And there's just a level of confidence from industry that we do them and do them well, right? So, I think they're just so well entrenched here for so many, at least for a couple of decades that I don't think we'd throw, we have barriers either in policy or just the way that we behave. Our own management style that somehow hinders them. We're always eager to use them when we can (DARPA4).

Significant findings for interview question 5b

Interview Question 5b is: What DoD-wide factors could be changed to impact use of OTs? Of the 20 participants interviewed:

- 5 of 20 (25%) participants discussed employee factors that could be changed to potentially impact DoD use of OTs.
- 19 of 20 (95%) participants discussed leadership and oversight factors that could be changed to potentially impact DoD use of OTs.
- 13 of 20 (65%) participants discussed training and communication factors that could be changed to potentially impact DoD use of OTs.

Appendix AA provides more information on the factors discussed by participants for this interview question. The significant findings for Interview Question 5b are:

Leadership should trust the judgment of agreements officers on OTs. DoD personnel should not suffer adverse career consequences just because an OT failed. Leadership should actively and publicly support OTs. OT templates, sample clauses, an online knowledge management tools should be provided to help DoD organizations more effectively use OTs. Fiscal policy should be changed to broaden the types of appropriated funds that can be used for OTs. A method for quantifying the benefits of OTs should be developed. The one-third cost share requirement for

traditional contractors should be eliminated because it deters traditional contractors from using OTs.

The overwhelming majority of participants (19 of 20) discussed leadership and oversight factors that could be changed to potentially impact DoD use of OTs. One factor that participants discussed was changing DoD's negative cultural viewpoint on failure. Employees have to be allowed to fail when it comes to OTs and failure should not result in adverse career consequences. DoD must trust employees that are delegated authority to award and administer OTs.

So, if you're going to use an instrument like this [OTs], you have to trust the people that you're giving the authority to use it. If you don't then just skip it, right? So, it's not enough to just say we're giving PCOs in these agencies the authority, right? To do this have to give it to them and then accept all the good, but also accept the occasional goof, and there will be a goof, just make sure we learn from the goof (DARPA4).

Another participant discussed using OT negotiation failure as a productive process to winnow out contracting officers that don't have the skills or flexible mindset required to negotiate good OT deals for the government.

I think people should be allowed to fail. And then if it's a small amount of cost, you weed out your failures pretty fast. You even weed out those who are not capable of creating good deals . . . There's no such thing as firing contracting officers . . . But the paradigm maybe should be that someone's not good for the job, then you lose authority, you go back to contracts (DPAP).

Several participants emphasized that organizational leadership must nurture and support OTs to increase the probability of their wider use. Participants were direct in their remarks

related to this theme. For instance, one participant stated: “The biggest thing is you have to have leadership cover” (OSD). Similarly, another participant suggested that “I think something that’s coming down from DoD leadership about the visibility and endorsing the use of OTs would be really helpful” (PIC). Further, “I don’t think it’s anything we can do. I think it’s something headquarters can do. Push the OTAs” (TARDEC).

Other participants tied leadership to the need to educate the DoD workforce about OTs. “Availability of senior leaders, education of the workforce from the ground up, all of those things can only lend towards using OTs and using them more effectively and more often as they make sense to do so” (SOCOM). Samples of other participant remarks under this theme are:

Having things like that [OT training] throughout different organizations, whether its Army-centric, its Service-centric and then DoD-wide, they make a lot of sense . . . I think coming from senior leadership at the DoD level would be instrumental in getting people comfortable saying, oh this is a thing, and it’s not illegal (PIC).

Leadership talked about it [recent changes to the OT statute] a little bit, but it never really got down to the users. Until we do that, the widespread usage the leadership expects us to be is not going to happen (DTRA).

An added participant discussed the impact of leadership on the uptick of numbers of OTs in DoD resulting from interaction with high-tech companies in Silicon Valley.

I think DoD’s just recognizing it too. That’s why we just talked about trying to do all these deals with Silicon Valley now and saying, hey, you guys have got the tech. Now, how can we work with you?” A lot of those companies just don’t want to do DoD contracts, but the only other choice you’ve got is to use OTAs. I think that’s picking up steam. I just think everything’s picking up steam on OTAs right now (MDA).

Still other participants discussed the need for leadership support to sustain efforts to get the word out to the DoD workforce about the benefits of OTs.

My only fear is that we get risk averse . . . That you take something [OTs] that's wide open to where policymakers have allowed you a wide discretion to use your head and do smart things, and then just dump a bunch of restrictive policy on it out of fear . . . I think people high up the food chain, the policymakers, sending the right message and then following through on the message . . . I think that's important . . . But it's not enough to just say it (DARPA4).

[OT] legislation gets passed, people kind of get excited about doing things and then maybe there's a little bit of excitement for a few years and then it kind of drops off and I think we just kind of got to light the flame again a little bit in regard to OTs . . . Maybe some of those people who were initially cognizant of the fact that this vehicle was out there, maybe they're no longer with the government, and so it just doesn't get passed along to sort of the next generation of contract folks, and so it is not even on their radar . . . Any sort of a renewed effort to kind of get it back out there in the public limelight, I think probably could be very helpful (SPAWAR).

Other participants discussed the need for leadership support from Congress and DoD.

One congressional theme that participants developed was the need for more fiscal flexibility on how appropriated funds other than R&D funding can be used for OT projects. The following participant quotes illustrate this theme.

We get asked all the time about OMA (Operational and Maintenance Army) money. Like, "I don't have R&D money [for an OT]. Why can't I use my OMA money on what we're trying to do?" . . . It gets down to fiscal law . . . Right now, the [OT] legislation and everything is . . . About prototyping . . . We aspire to remain true to that prototyping. What does it look like if you could do everything [beyond R&D projects] under an Other Transaction Agreement (DOTC)?

If Congress were to make a better, more flexible way for us to spend money . . . think that would be really beneficial, because . . . When you're looking at OTs, you can move so rapidly. From prototype to production, for example. Or the thing that your prototyping, it might be a completely commercial item. So, using the Financial Management

Regulation (FMR), you can make an equal case for using R&D or O&M (Operations and Maintenance) [funding] using the same product . . . If you have more flexible funding, you might be able to operate on a more commercial-like basis with nontraditional companies, and that would be a big advantage for us (DIUX).

Another participant discussed the negative impact that the OT statute's one-third cost share requirement for traditional contractors has on the wider use of OTs.

One of the things that prevents a lot of people from using OTs with traditional companies is the one-third cost share rule. So, traditional companies, if they're not partnered with a nontraditional or small business, they have to pay a one-third cost share of the cost. And what that translates to is that the public relations message is traditional companies can't use OTs. Which is not correct. But I think [the one-third cost share for OTs with traditional contractors] prevents a lot of organizations and DoD from using them [OTs] because they work primarily with traditional companies (DIUX).

If we can help transform the overall way in which DoD executes acquisition and uses OTs more frequently, then traditional companies will reform their processes to conform to that . . . But again, since so many other organizations in DoD work primarily with only traditional companies, that one-third cost-share can be a big factor. So, if you're able to get that changed, I think that would be really beneficial (DIUX).

Still another participant wondered about the potential impact of recent changes to the OT statute that authorize DoD organizations to award follow-on production contracts to OT contractors.

I'm sure you know, the [OT] legislation changed recently to allow production to happen on a contract or a transaction . . . Well, what does that look like? Would that still come through the consortium? Would that just be a direct award between the government and the member . . . What would a maintenance contract or a service contract look like under another transaction agreement (DOTC)?

Participants also discussed the need for leadership to actively support the use of OTs.

One way that leaders can do this is by issuing additional policies to promote the use of OTs. For

example, one participant called for DPAP to “broaden the definition of prototype” (PEO-CBD). Another participant suggested that OTs should be the default type of agreement for R&D projects: “Require R&D and procurement folks use an OTA first and document why a FAR-based or other contracting method is better—get approval to not use an OTA” (TARDEC). As discussed previously, an additional participant discussed the need for higher dollar thresholds of OT approval at the DoD organization, vice the Pentagon level.

Yes, it was not delegated, so we actually went back to DCMO and said, we need the authority for up to a \$250 million. So, we received that authority to do it. That would've been the other thing is . . . \$5 million . . . That doesn't get me anything. I need the authority that (USD)AT&L has. So, the authorities to be able to use them, perhaps these other [DoD] organizations don't have that authority (SCO).

A Navy participant discussed the need to integrate OTs into the policy that DoD uses to manage the program life cycles of its weapons systems procurements, DoD Instruction 5000 (DoD 5000).

When we do acquisition . . . We like to call it a traditional program and . . . Then . . . Kendall [a former senior DoD procurement official] introduced these ideas of models. So, now, everybody can look at models in DoD 5000 . . . Well, I think as we move forward, policy has to reflect . . . I'm a prototyping project. My mechanisms in which to do that is an OTA. So, as we get better at this and policy evolves, [we] . . . May not have the mechanism or the regulatory and statutory requirements associated. Now we could use OTAs as a support element to moving prototypes along. I think as we move our naming convention into what a prototype is while in the program acquisition system [DoD 5000], OTAs could be that supporting element (NAVYHQ).

Other participants talked about how DoD policy should be clarified and expanded to support the wider use of OTs. For example, a DARPA participant remarked "I think it's not clear whether it should be advocated that people should use OT to the extent possible, or OTs should

be used as an exception. It's not clear what's the DoD policy" (DARPA1). Some other participants talked about the inability to quantify the benefits of OTs to their organization.

There's no way to quantify the benefits of using an OT in terms of a quantitative measure. Qualitatively, I think it would be easy for program managers and program folks to kind of explain from a qualitative perspective how using an OT was beneficial. We have no repository where we're quantifying these things. You're really going to get anecdotal information. It's not information that (sic) it's been cataloged, verified, vetted (DARPA2).

Several participants pointed to the need for samples clauses and OT templates to help their organizations more efficiently draft OTs. The following are examples of participant quotes under this theme.

I think having examples that are shared amongst DoD to look at, I think would be beneficial (AFRL).

I think that one of the central issues is that there's no one repository for OTs. You just sort of have to piecemeal and do a lot of research in order to get legitimate information on OTs. It would really behoove the DoD to set up maybe a website where we can have . . . All the literature on OTs that's available. Here are some templates. Here are some best practices. There are also other organizations who could be using OT authority, but are they using it in the spirit in which it was meant to in the law? . . . I don't know how often there are checks and balances that come back and say, okay, well, we have this authority (DARPA2).

I think [that] a really good start [would be] the DPAP guidance [OT Guide] and expanding it somehow, maybe having an annex of samples or maybe a little bit more guidance. I think maybe one way that they [DPAP] could help to guard against their guidance ending up marking the whole universe of what can be done with an OT would be to come up with really broad or a very broad range of samples, where they have sample clauses from close to the full spectrum of what you might want in an OT, so that it helps to preserve the flexibility, while also giving agreements officers somewhere to start with if they don't happen to be in an organization that routinely awards OTs (AFHQ).

Because I think that probably the way these things are done in practice is that we do have sample agreements, it's just that each individual organization that awards OTs develops their own library that is tied to the individual employees working in their organization. It's not easily shared across [DoD] organizations unless you've got personal relationships between those organizations, and its knowledge that is not easy to preserve in the face of turnover in units. I think if there was some way to develop a library or just . . . Guidance or at least model agreement formulation and maybe sample clause formulation, I think that could usefully be done at the DoD level if it's done with an eye towards preserving flexibility and . . . Recognizing the risk that anytime that they put something forward as an example, it could be taken as mandatory . . . I think they could play a useful role in helping to institutionalize best practices and disseminating sample clauses and agreement forms (AFHQ).

Another participant described the need for sample OT agreements in broader terms, tying it to the need for better communication within DoD about OTs.

You know I think it could just be a little bit more awareness, a little bit more information. I mean I'm not sure if we have an instruction that really is specifically dedicated to OTs or any kind of directive, but I think just maybe just having some kind of dialogue . . . Some kind of general guidance I think would be helpful to say look, here are some of the benefits [of OTs] . . . Here are some examples. Here are some people you might talk to, and it could be . . . A two or three-page document that kind of gets passed around (SPAWAR).

Participants talked about the role of leadership in transforming how DoD organizations think about and execute OTs. For example, one former Pentagon policy official discussed this theme in the context of the recent reorganization of the Pentagon procurement leadership functions.

DPAP's responsible for the high and the low, and when you are in some ways that hobbles your ability to really focus on the high tech . . . They should really consider making OTs to fall into R&E shop [at the Pentagon]. There should be a procurement piece for R&E, separate from DPAP. If OT sticks with DPAP, the downside is that DPAP is responsible for the commodity type procurements . . . Billion-dollar acquisitions . . . But the more interesting technologies are not the big dollar, billion-dollar programs.

It's the sub-billion-dollar programs. Maybe a few million. If OT stays with DPAP, it won't get the [necessary leadership] attention (DPAP).

A DARPA participant discussed the positive policy impact that could be achieved if the DoD IG and GAO were required to send auditors to DoD organizations to investigate why the organizations are not using OTs more widely. This type of investigation might help educate the auditors on the benefits of OTs.

It might be nice to . . . Have the auditors go out, have GAO go out, have the DoD IG go out [to DoD organizations] and say, Why aren't you doing more OTs? Really get them [the auditors] educated as to the benefits of OTs. Hopefully with that kind of an approach . . . The default would be, well, we're not going to criticize them [DoD organizations] because they didn't do what was in the FAR. We're going to praise them because now we [auditors] understand what OTs are for and why they're good in certain, not in all situations, but in certain situations. I think the less you get bashed by the auditing community; I think the more you're willing to do OTs (DARPA3).

Other participants discussed the constraints that current procurement policies impose on doing OTs, and procurement in general, and how these policies can be used as justifications for punishing failure.

One of the constraints that DTRA encountered was the way we do acquisition in general. And that's not just DTRA. I think that's acquisition across the DoD, and even the other agencies. In that the [lack of] speed, or lack of acquisition process (DTRA).

So, you don't want to then turn around to build a bunch of scary policy around it [OTs], right? And ruin it, right? Because the whole goal of these things [OTs] is the flexibility to be able to move around in a way that does as much as we can to protect certain basic things that are concerns to us like limitation of liability and certain rights to things. So not dumping a bunch of policy on it and then not turning around when something goes wrong. And something will go wrong; it just happens . . . And then punishing everybody for it. Writing policies that start making all kinds of reviews, right? We did that when the [Army's] Future Combat Systems . . . We punish the entire DoD for one mistake. I

don't think that's the way to respond, right? Up training, figure out how to better communicate the rights and the wrongs (DARPA4).

One of the things that I have discovered that I haven't been able to resolve that much is if I can get the operational community to ask the acquisition community why can't we do this through an Other Transaction Agreement so that it'll be written in a way that we can trade requirements . . . This is what we tend to do when we have a FAR contract. We'll say, within these terms and conditions, here's this requirement document and you pretty much have to do everything to show us that your system meets every single requirement in this requirements document (OSD).

Did you see all of the stuff that was coming out of Better Buying Power 3.0 [a Pentagon procurement policy governing traditional procurement agreement]? It had its level of penetration [across DoD], and it had its level of success, and it had its level of people not knowing about that should have, and people not buying into it. I think that's what OTAs need. They need coherent, cohesive advocacy across the Department. Target at three communities, the contracting community, the resource development community, and the operational community . . . Advocacy . . . Policy does not equal practice (OSD).

Significant findings for interview question 5c

Interview Question 5c is: What factors do you believe are resistant to change, but if changed, would impact the use of OTs? Of the 20 participants interviewed:

- 9 of 20 (45%) participants discussed employee factors that are resistant to change, but if changed, would potentially impact the use of OTs.
- 15 of 20 (75%) participants discussed leadership and oversight factors that are resistant to change, but if changed, would potentially impact the use of OTs.
- 6 of 20 (30%) participants discussed training and communication factors that are resistant to change, but if changed, would potentially impact the use of OTs.

Appendix AA provides more information on the factors discussed by participants for this interview question. The significant findings for Interview Question 5c are:

Institutional inertia causes DoD employees and organizations to continue to use TPAs instead of OTs. Leadership must be actively involved in breaking institutional resistance to change that arises from habitual reliance on TPAs and employee risk aversion to trying new procurement tools such as OTs. Leadership should implement procurement policies and provide training and knowledge management that encourage and support the use of OTs.

The majority of participants (15 of 20) discussed leadership and oversight factors that are resistant to change, but if changed, would potentially impact the use of OTs. One theme that participants explored was the need to develop new ways of business such as OTs, and to invest the time and effort to make them succeed. For instance, a participant discussed internal resistance that his organization has encountered in standardizing source selection procedures.

I would say within my organization, the resistance to change is, there's a resistance to tailoring. Especially in, we're trying to standardize our source selection criteria a little more, and there's a lot of resistance to that, bottlenecks (PEO-CBD).

Another participant discussed this theme in terms of the necessity to invest time and effort into trying new methods of business, which, while slower, may give better procurement results than current methods.

Some people have found a way that works, and it's not the best way, but it worked. It's just the expedient way, and we've got to stop looking at what's the fastest because you can't always go fast. You're going to crash and burn down the road (MDA).

About OTs, an added participant discussed how a program manager feared post-award protests against a follow-on production contract from a prior OT.

If he just did the prototype project through the other transaction, then he had to do a FAR competition, he was concerned that he would then be ripe for protest because of any of the other competitors . . . Could say that the prototype developer had an unfair competitive advantage . . . He felt that he was potentially subject to protest by doing that. Obviously, with the other transaction, the possibility of protest doesn't really exist (NSC).

Some other participants discussed this theme from the perspective of the OT contractor. One participant, for instance, stated: “I just feel like there's a shortage of contractors” (SCO). Another participant discussed the importance of carefully analyzing the facts surrounding a procurement, particularly the OT contractor's intent about intellectual property developed under the OT.

I think we need to do more critical thinking about all the facts surrounding a particular action and just analyze it and make the right choice depending on what the facts are. I think we've covered most of the facts that I consider as IP, commercial data. What's the intent of the contractor? What does the contractor want to do in the future (DARPA3)?

Another theme that participants touched upon was the need for leadership support and how such support is necessary to break resistance to change. Several participants, however, positively discussed leadership support for OTs at their DoD organization.

There are few, bottlenecks . . . [to] OTs if you have leaders who support the teams . . . Like DIUx. DIUx was allowed to exist; the leadership made its decision to allow them to exist. I think then that they [DIUx] will continue to grow and be influential . . . and if we were able to do that . . . Why can't you do modular contracting, right? So, the more interesting things for OT because there are so few of them isn't what have we done; it's what have we not done. What have we not thought of (DPAP)?

There is no reservation here at headquarters to use OTs. Our local leaders are on board and are proponents. I don't know, at the senior leadership level, if everyone is on board. Possible bottlenecks would come into play if senior leaders are not a proponent. Further, bottlenecks could occur if we do not properly train our personnel on the topic (SOCOM).

On the other hand, another participant discussed how the leadership at his organization is risk averse and that this contributes to resistance to change.

And also, leadership, who are very much risk averse . . . We got to utilize new ways of doing business, but not every senior leader is going to want to be . . . Open to anything that would potentially be a risk to the organization. So, that's another hindrance to being resistant to change is that we have leadership who don't want to put themselves out there. And they could believe that the OT also is a lot of risk to the organization (DTRA). Another participant implied a leadership role in changing negative perceptions about OTs.

Because OTs have this perception—well it's not a perception, they are easier to use—but I think it's about a perception that because they're easier to use, they must be doing something illegal, or you have the flip side of that with looking at it and thinking that you're getting around the FAR. I hear that a lot, that term, okay, so we can do this to get around FAR? It's not about working the acquisition system. It's another tool in the toolbox, another way of doing business with the government, another way of attracting small businesses, nontraditional, to work with the government that you wouldn't necessarily tap into in the FAR-based world (PIC).

Another resistance to change theme that participants discussed was the need to change DoD culture to learn from, not punish, failure.

When you're using something that's new and unique, there will be things that go wrong, right? There will be failures maybe you missed something during negotiations. There will be things that probably don't go right. I think that what they should be looking for is making sure that upper-level management in each of these agencies has the visibility that they make sure that the things that go wrong aren't so critical that they're undermining what the DoD is doing (DARPA4).

But there's just a lot of failure when you do S&T, right? You're trying to pull a string on things that don't currently exist not everyone's going to be a home run, but you have to try them all, right. Otherwise you won't find that the next Internet, so to speak . . . But the successes are great, and it makes all the other strings you pulled that don't lead anywhere certainly worth it. Besides, you're learning every time you do one of those it fails (DARPA4).

Other participants discussed leadership and resistance to change in the context of the need for policy change. For example, one participant talked about the need to delegate more authority to contracting officers to negotiate OTs: “I guess the factor that is resistant to change would be, I would say, delegate more judgment to the contracting officer” (DARPA3). Another participant discussed the need for employees to have policy support to choose procurement instruments for business instead of expediency reasons.

If people know that an OT agreement is not necessarily something super exotic that needs to be just defended as something that you would ever even consider, if people are able to . . . Make the form of agreement decision based on which sort of arrangement with the company makes the most sense, is the FAR contract the best tool, is an OT the best tool, if they're able to make that decision based on what's the right way to structure the arrangement for what we're trying to accomplish rather than what's the easiest way for my organization to get this work awarded, then I think that's where we would want policy to empower units to be at (AFHQ).

The Joint Staff [at the Pentagon] . . . We're set up to develop joint requirements and then big muscle [programmatic] movements . . . So . . . How can we evaluate requirements and hone in on the right requirement and the right solution for it, while simultaneously adding competition into our system so that when we get to the end of our honing, we're looking at, we're competing different projects, different solutions as the requirements are honing in, and then we accelerate into production after that? OTAs provide that mechanism (NAVYHQ).

Participants discussed habit and risk aversion as sources of resistance to change. One participant, for example, observed that sparse use of OT could be “just the resistance to change,

period” (MDA). Other participants spoke more at length about risk aversion and fear of change in DoD organizations.

One of the issues is that we were such a risk-averse organization . . . We have new leadership now . . . Who is really pushing novel ways of doing business? You know, supporting the people that are on the ground to make sure we get our mission done (DTRA).

If . . . DoD organizations could adopt this kind of same open-mindedness and lack of fear of OTs, then that would go a long way in making them [OTs] successful. An OT is not right for everything . . . But I think right now OTs are probably being under-utilized. I think usually the shortest path to getting that done is a FAR contract just because there is so much inertia and organizational support behind awarding FAR contracts that trying to do an OT is an uphill battle. Even if everybody's on board with it, there's just not the institutional support for doing that (AFHQ).

I think, you know, maybe aside from maybe not being generally aware [of OTs] . . . the other part of it too is maybe just the organizational hesitance to sort of stray from the ordinary . . . I think . . . In the government setting . . . People are a little more resistant to change. They like to do what they've always done. They know it works. I think if we could put some information out there about the different, give some examples about what different department agencies have done through the OT agreements, you know, success stories so to speak, I think that would be helpful to getting maybe a wider adoption of OTs, as sort of another tool in the toolbox that you don't have to be afraid of (PIC).

Related to risk aversion and fear of change, participants discussed institutional inertia as a source of resistance to change.

It's been institutionalized how we do business, and so changing that does not happen quickly. It takes a lot of energy, and this day and age, folks are seemingly busier and busier, and trying to get someone to really stop, take the time to learn, and commit to the resources, and the time, and the energy that it's going to take to change . . . It's a challenge (DOTC).

The biggest [problem for OTs] is probably just organizational inertia . . . People tend to want to essentially do what they've done. If people know how to award a FAR contract,

they're going to want to continue to do that unless they have come compelling reason to do otherwise. I think there's a lot of inertia that probably predisposes units to just continuing to do what they've done in the past. I think there are ways to overcome that type of inertia. I think training, guidance (AFHQ).

But I don't think it's [resistance to change] born from not wanting to do good. It comes down to understanding and having the time and energy. And it's not just contracting and legal. It's even on the program side of things. You're literally talking about changing how acquisition is done, and how we do business. So, you're fundamentally cutting at the heart of what they know, and they're used to, and just getting everybody on board with agreeing to do business differently (DOTC).

Chapter 5–Case Studies Findings

Introduction

This chapter provides the findings for two OT case studies. The purpose of the study is to investigate institutional factors that may have impacted how widely DoD organizations have used OTs. Thus, the study's research question is: Why, despite their reported administrative advantages, are OTs only sparingly used by DoD compared to more administratively burdensome traditional procurement agreements?

Considering this research question, the research hypothesis is: Although Congress has amended the OT statute to encourage wider use OTs, DoD has continued to use OTs sparingly. Based on the researcher's professional experience, institutional resistance to using OTs can be traced to path dependence and positive feedback mechanisms such as low leadership support and employee risk aversion and habit. The numbers and variety of OTs at some DoD organizations, however, indicate that institutional change is occurring, and this may lead to a critical juncture or policy tipping point, resulting in wider use of OTs across DoD.

This chapter focuses on presenting the findings for two cases studies of DARPA programs with ongoing OTs. A recap of discussion from earlier chapters may be useful in situating the case studies within the broader framework of the study. Thus, this chapter begins by revisiting discussion from Chapter 3, including outlining how the OT case studies were selected. Next, the chapter briefly summarizes the case study research design and protocol discussions from Chapter 3 and the conceptual framework discussion from Chapter 4 to show how those sections apply to the OT case studies presented in this chapter. The rationale for

selecting OT case study participants is also revisited. How the case study findings are discussed, and the purpose of the findings roadmaps, are briefly summarized.

The rest of the chapter is devoted to presenting the findings for the two OT case studies. The findings of each case study are introduced by discussing the case study's organizational setting. Following the same methods used in Chapter 4, the chapter then presents the case study participants' perspectives to derive case study major findings, including perspectives related to case study significant findings that support the major findings. Chapter 6 discusses potential causal mechanisms corresponding to these major findings

Selection of the RSGS and Living Foundries OT case studies

Chapter 3 discusses how the researcher selected the case studies from a list of potential case studies identified by organization participants. To recap, the researcher picked the RSGS case study because it involves a traditional contractor working on a space (robotics) technology program for DARPA. Space robotics is vital to national defense and is a growing part of DARPA's space technology portfolio. The researcher selected the Living Foundries case study because it involves two nontraditional contractors working on a synthetic biology program. Synthetic biotechnology is critical to national defense and is a growing part of DARPA's burgeoning biotechnology portfolio.

The researcher also selected these two case studies because they span traditional and nontraditional contractors, and thereby these cases provide a control variable—contractor type—that might improve the internal and external validity of the study. The comparative case study literature discusses the importance of addressing internal and external validity. External validity

is high when inferences about the research sample can be generalized widely beyond its boundaries (Eva & Martino, 2017, p. 10). As discussed in Chapter 1, the study has modest goals for external validity. By selecting case studies involving traditional and nontraditional contractors, the researcher hopes to enhance the external validity of the study so its findings might be useful to the DoD OT program and perhaps to other federal agency OT programs. Internal validity means that the inferences drawn represent the cases being studied (Eva & Martino, 2017, p. 6). The research design and methodology described in Chapter 3 was developed to help enhance the internal validity of the study. The researcher was careful to avoid personal bias during analysis and interpretation of the participant interview remarks, improving the study's internal validity. By selecting case studies from OTs suggested by the participants, the researcher hopes to decrease personal bias in selecting representative case studies, again improving the study's internal validity.

Case study research design

Chapter 3 discussed how the case study protocol is part of the overall research design. To summarize here, McNabb (2008) explains six steps for preparing case studies. Step one is to frame the case. Step two is to operationalize case constructs. Step three is to define the unit of analysis. Step four is to collect the data. Data collection can include interviews, observation, and other forms of qualitative data collection. Step five is to analyze the data. Step six is to make case study findings. The research design discussed in Chapter 3 encompasses steps one through five. This chapter addresses McNabb's sixth step—making case study findings.

Chapter 3 also explains how the researcher determines that qualitative methods such as a multisite case study are more useful for answering the research question than using quantitative methods, for instance, multivariate regression analysis. Based on the prior literature on research designs discussed in Chapter 3, the researcher determines that the best way to answer the research question is to use qualitative interviews to find causal mechanisms related to the organization major findings, and that these mechanisms can be triangulated using a selected pair of OT case studies. This enables an integrated research design consisting of organization interviews and a pair of case studies. The case studies are used to triangulate the organization interviews. Specifically, the study tries to develop a systematic analysis process to figure whether potential causal mechanisms identified in the organization interviews are replicated by potential causal mechanisms identified during the OT case studies.

Also discussed in Chapter 3, and developed further below, the researcher selects a multiple case design. The researcher finds that Yin's (2009) replication method approach is a suitable approach for integrating the OT case study findings presented in this chapter with the organization interviews findings presented in Chapter 4. By selecting representative OTs, the researcher hopes to replicate major findings from the organization interviews. Thus, following Yin, the two OT case studies discussed in this chapter are conceptualized as quasi-experiments to help discern whether the findings replicate the organization interviews findings. Implicit in this approach, the OT case studies are conducted and analyzed using the same processes and methods as the organization interviews.

So, the researcher is also interested in determining if potential causal mechanisms related to the organization interview findings are replicated in the OT case studies. Based on a review of the case study method literature, the researcher adopts the mechanistic comparative case method

of Beach (2016) and Yin (2009) for the OT case studies. Beach proposes a mechanistic approach for a comparative case analysis where representative cases are selected from a homogenous population of cases to help develop research inferences and that are assumed ontologically relevant to the population. Here, the case study population is awarded, ongoing DoD OTs. The population is assumed to be homogenous for study purposes. The unit of analysis is an OT.

According to Beach, a mechanism is a variable identified within a case study that is inferred to produce an outcome that the researcher is interested in studying. Beach discusses that a set of mechanisms are identified that are common to two or more cases and these mechanisms can infer an outcome common to all cases. Yin takes a similar inductive approach to Beach. In what Yin refers to as the replication method of comparative case studies, he recommends selecting cases representative of a homogenous population of other cases. The cases are studied with the goal to find mechanisms explanatory of the outcome that is the focus of the research. In this sense, the cases are assumed to be literal replications of the cases in the larger population.

Following Yin and Beach, the researcher conducts the OT case studies as quasi-experiments, where the researcher tries to find potential causal mechanisms that can, in future research, be hypothesized as explanatory variables for the research outcome of interest. This approach appears to be dependable because the DoD OT program appears to be a homogenous population of OTs. Thus, findings from the DoD organization interviews are used to find potential causal mechanisms that might help answer why the DoD is not using OTs more widely. In Chapter 6, these causal mechanisms are triangulated using the causal mechanisms derived from the case study findings that follow.

Case study protocol and participants

As discussed in Chapter 3, Yin (2009) recommends that researchers develop a dedicated case study protocol for qualitative studies involving case research. The protocol should include field procedures such as sources of data, sites visited, human subject protections, and procedural safeguards. Since the case studies are part of the study's overall research design, a separate case study protocol is not developed. The data collection methods presented in Chapter 3 apply both to the organization interviews and to the OT case studies.

Data collection for the case studies, however, differed from the organization data collection in two critical aspects. First, the process for selecting OT case studies differs from the process used for selecting the organizations for the participant interviews. Second, the process for selecting participants for the case studies differs from that used for the organization interviews. First, the process used for selecting OT case studies is different in the process used for selecting the organizations for the participant interviews. The OT case studies are chosen from a list of potential OT case studies recommended by participants. Appendix V provides the list of prospective OT case studies identified by participants. The researcher reviewed these OTs identified by the participants, including OTs that participants considered being failures. For example, it would have been interesting to use a control variable consisting of one case study on a failed OT and a second case study on a successful OT. This approach could have yielded a rich assortment of findings and potential causal mechanisms to help the researcher answer the research question. But Chapter 3 explains why the researcher decided not to use OT failures as case studies because those identified by participants turned out to be unsuitable for practical reasons such as lack of document data and available participants.

As discussed in Chapter 3, for practical purposes, the researcher selected OTs that are ongoing, that are meeting their technical objectives, and that are awarded by DARPA. The researcher is also interested in selecting one case study involving a traditional contractor and a second case study involving nontraditional contractors. The researcher believed this control variable—type of OT contractor—will improve the internal and external validity of the study. Guided by these considerations and the list of OT cases studies recommended by the organization participants, the researcher picks the RSGS OT as the traditional contractor OT case study and the Living Foundries OTs as the nontraditional contractor OT case studies. These OTs are awarded by DARPA and are meeting their technical objectives. The OTs, and their respective contractors, are discussed in more detail below.

Second, the process for selecting participants for the OT case studies differs from that used for selecting participants for the organization interviews. Participants for the case studies are not limited to former and current DoD officials and consortia officials. Instead, the researcher also includes OT contractors as part of the OT case studies because a goal of the case studies is to interview key employees involved in negotiating and administering the OTs. OT contractor personnel are important players in negotiating and administering the OTs. Thus, the OT cases studies focus on interviewing a smaller, more cohesive sample of participants that for the organization interviews, namely, participants directly involved in negotiating and administering the OTs that are the subjects of the case studies.

Since the OTs are conceptualized as quasi-experiments, the researcher tries to select participants that could offer relevant and insightful information about the OTs that would lead to useful case study findings. Thus, the case study findings discussed in this chapter are derived from qualitative interviews with agreements officers, program managers, key support

contractors, and OT contractors that are directly involved in performing these ongoing OT. The following Tables extract data from Table 15 in Chapter 3 and summarize participants for the case studies.

Table 25. RSGS OT Case Study Participants and Interview Types

Participant	Identifier	Participant's Organization	Interview Type
1	RSGS1	DARPA	In-person
2	RSGS2	DARPA	In-person
3	RSGS3	DARPA	In-person
4	RSGS4	DARPA	In-person
5	RSGS5	Space Systems/Loral, LLC	Telephonic

Source: Author.

Table 26. Living Foundries OT Case Study Participants and Interview Types

Participant	Identifier	Participant's Organization	Interview Type
1	LF1	DARPA	In-person
2	LF2	DARPA	In-person
3	LF3	DARPA	In-person
4	LF4	Amyris, Inc.	Telephonic
5	LF5	Zymergen, Inc.	Telephonic

Source: Author.

Participant interviews for the OT case studies were conducted between November 2017 and January 2018 and followed the Virginia Tech IRB informed consent requirements.

Interviews ranged from 30 minutes to 1½ hours, depending on how much information the

participants wanted to offer. Because there are relatively few participants involved in each of the OT case studies, and because the participants knew each other from daily work experience, it was easier for the researcher to gain informed consent from participants in the OT case studies than it was for participants in the DoD organization interviews. Thus, as illustrated in the Tables above, the study gathers information from a cohesive sample of participants that are directly involved in negotiating and administering the OTs of the case studies.

How the case study findings are discussed

Below is a discussion of the interview findings for the two OT case studies using selected quotations from the participant interviews that help explain and support each finding. Following the same analysis method outlined in Chapter 4, major findings are summarized for each of the five main interview questions. The major findings are supported by significant findings for each of the interview subsidiary questions corresponding to the main interview questions. The significant findings for the interview subsidiary questions are each supported by a discussion of participant responses to the subsidiary question, organized by emergent sub-codes identified for the subsidiary question.

Since the case studies are conducted to try to corroborate the major findings and corresponding potential causal mechanisms derived from the organization interviews, the case studies used the same coding scheme, including the same emergent sub-codes, that are used for the organization interviews discussed in Chapter 4. Like it does in Chapter 4, the study conducts a basic content analysis of the case study interview data. Specifically, for each interview subsidiary interview question, the frequency of participant responses is tabulated by the

percentage of participants that make remarks that are coded with each emergent sub-code related to the subsidiary question.

Thus, the OT case studies use the same frequency of response analysis method as the organization interviews. This content analysis is used to help figure the most significant findings for each case study interview subsidiary interview question, which contribute to determining the major findings for each of the five interview questions. The descriptive language used to discuss the interview response frequency ranges for the case study interviews is:

- 100% = all
- 95% = overwhelming majority
- 75-90% = large majority
- 55-70% = majority
- 25-50% = some
- 5-20% = few

Appendix CC provides data summary tables for the case study interviews. The tables give summary-level data each of the five main interview questions and their corresponding subsidiary interview questions. The tables present the frequency of case study participant responses to the relevant interview question using the method summarized above and discussed in Chapter 3.

Following the analysis methodology discussed in Chapter 3 and used in Chapter 4, not all findings are discussed below due to the volume of data collected during the case study interviews. Instead, the discussion only summarizes the most frequent case study participant

responses to the relevant interview question. Frequency is determined using the percentage ranges cited above. The case study participants generally focus their interview remarks on the OT that is the subject of the case study instead than of on OTs in general. Thus, the participants for the Living Foundries OTs mostly focus on those OTs when answering the interview questions and the participants for the RSGS OT mostly talked about the RSGS OT.

The discussion of findings for each of the two case studies that follow starts by summarizing the major findings for each of the five interview questions. Then, significant findings are provided for each main interview question using the process outlined above. For each interview question, significant findings are also presented for each related subsidiary interview question. There are several major findings for each interview question.

The case study findings are reported in a narrative format, using extensive verbatim quotations from the case study participants to convey their perspectives and opinions. The goal of reporting the case study findings in this manner is to convey the richness and complexity of the participants' varying responses to the interview questions and to let the participants speak for themselves. A goal of discussing the findings in this manner is to present them as objectively as possible, without researcher bias or opinion. Since the case studies are meant to be quasi-experiments—that is, meant to triangulate the findings from the organization interviews—the OT case studies are conducted, and are presented below, using the same methods and discussion format as the organization interviews.

Findings Roadmaps for the OT Case Studies

Appendix DD and EE provide findings roadmaps for the RSGS OT case study and the Living Foundries OT case study. Chapter 4 discusses the purposes of preparing the findings roadmap for the organization interviews. This discussion also applies to the findings roadmaps for the OT case studies presented in this chapter.

RSGS OT Case Study

The first case study focused on an ongoing OT awarded to a traditional contractor under the DARPA RSGS program.

Organizational setting

DARPA is a defense agency that falls under the authority of the Undersecretary of Defense for Research and Engineering (USD(R&E)) in the Pentagon. DARPA is located in Arlington, Virginia. The mission of DARPA is to serve as the research and development organization in DoD with the primary responsibility of maintaining U.S. technological superiority over adversaries (DODD 5134.10, 2015). DARPA has 220 government employees in six technical offices, including 100 program managers, who together oversee about 250 research and development programs (DARPA, 2018a). DARPA's research portfolio is managed by these technical offices and is charged with developing breakthrough technologies that lead special

projects and the transition of DARPA-funded technologies into DoD capabilities (DARPA, 2018b). Appendix P provides more organizational information about DARPA.

The RSGS OT discussed below is managed as part of the program portfolio of DARPA's Tactical Technology Office (TTO). The mission of TTO is to provide or prevent strategic and tactical surprise with very high-payoff, high-risk development and demonstration of revolutionary new platforms in ground systems, maritime (surface and undersea) systems, air systems, and space systems (DARPA TTO, 2018). As discussed below, the RSGS program is developing a revolutionary new space systems platform. The program includes an ongoing OT that is being performed by a commercial contractor, Space Systems/Loral, LLC (SSL):

SSL designs, manufactures, builds, and integrates satellites, satellite systems, and spacecraft systems for commercial and government customers around the world (Bloomberg, 2018a). SSL offers geosynchronous satellites; a space-proven platform for various satellite services; hosted payloads; and direct broadcast satellites, digital audio radio satellites, mobile satellite services, fixed satellite services, broadband satellites, and government programs (Bloomberg, 2018a).

According to its public website, SSL has built more geostationary communications satellites on orbit today than any other manufacturer. This includes spacecraft for services such as direct-to-home television, video content distribution, broadband internet, and mobile communication—the technologies billions of people use every day (Space Systems/Loral, 2018). SSL is a traditional contractor for OT purposes. SSL's federal government customers include DARPA, NASA, and NOAA. SSL is based in Palo Alto, California. Since 2012, SSL has been a subsidiary of Macdonald Dettwiler & Associates Ltd. SSL generates about \$429 million in annual revenues and employs about 75 people at its headquarters location and 1,400 total employees across all locations (Buzzfile, 2018).

RSGS program overview

The DARPA RSGS program is a national security space program that has emerged from the last fifteen years of DARPA investments in space robotics, notably including DARPA's recent Phoenix program (Phoenix, 2014). The Phoenix program began in 2011 with the objective to develop and demonstrate robotic capabilities in or near high earth orbit to harvest and reuse antennas from decommissioned satellites to create new satellite capabilities (Phoenix, 2014). In 2014, DARPA transferred the development and demonstration of robotics and tools to a temporary program called GEO Robotics which eventually became the RSGS program (DARPA-SN-14-51, 2014).

The RSGS program started in March 2016 and may continue through fiscal year 2023. Total DoD funding for the program is over \$300 million. The goal of the RSGS program is to develop and demonstrate a dexterous robotic operational capability in Geosynchronous Earth Orbit (GEO) that can both provide increased resilience for the current military space infrastructure and be the first concrete step toward a transformed space architecture with revolutionary capabilities (DARPA-PS-16-01, 2016). The RSGS program public website discusses the challenges RSGS will address.

Hundreds of military, government, and commercial satellites reside today in geosynchronous Earth orbit (GEO) some 22,000 miles (36,000 kilometers) above the Earth—a perch ideal for providing communications, meteorology, and national security services, but one so remote as to preclude inspection and diagnosis of malfunctioning components, much less upgrades or repairs. Even fully functional satellites sometimes find their working lives cut short just because they carry obsolete payloads—a frustrating situation for owners of assets worth hundreds of millions of dollars. With no prospects for assistance once in orbit, satellites destined for GEO today are loaded with backup systems and as much fuel as can be accommodated, adding to their complexity, weight, and cost. But what if help was just a service call away? DARPA's Robotic Servicing of Geosynchronous Satellites (RSGS)

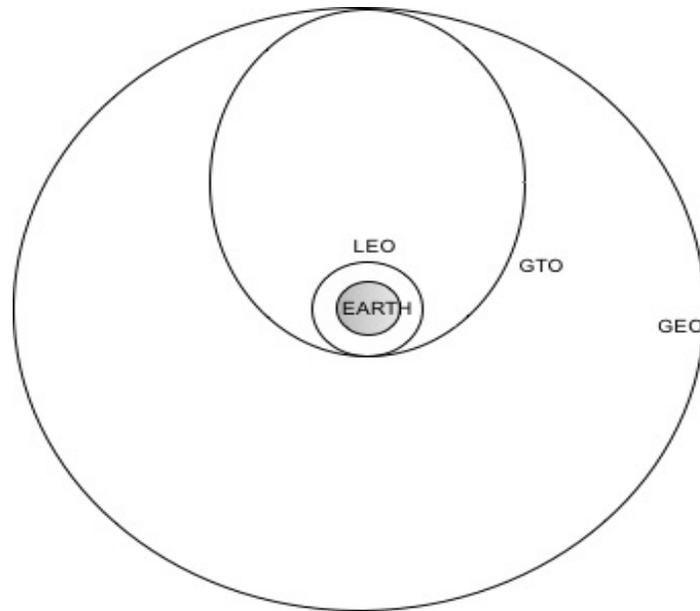
program intends to answer that question by developing technologies that would enable cooperative inspection and servicing in GEO and demonstrate those technologies on orbit. Within the next five years under the RSGS vision, a DARPA-developed modular toolkit, including hardware and software, would be joined to a privately developed spacecraft to create a commercially owned and operated robotic servicing vehicle (RSV) that could make house calls in space (RSGS, 2018).

The following explains and illustrates the three types of satellite orbits relevant to the RSGS program: Low Earth Orbit (LEO), Geosynchronous Transfer Orbit (GTO), and GEO:

- LEO is any orbit 100 to 1,500 miles above the Earth. Due to gravity, a satellite must be moving about five miles per second to stay in LEO. The International Space Station and the Hubble Space Telescope are in LEO as are hundreds of operating satellites and tens of thousands of pieces of debris (space junk).
- GTO is an orbit where a launch vehicle will place a satellite intended for GEO. It takes more energy to get the satellite into GTO than into LEO but less energy than is needed to get a satellite into GEO. Once in GTO and near GEO, a satellite uses its onboard rocket motor to gather enough speed to enter GEO. Thus, GTO is a temporary orbit where a satellite is placed before boosting itself into GEO.
- GEO is an orbit about 22,000 miles above Earth's equator. Satellites in GEO appear to be stationary when viewed from Earth because they orbit Earth in one day. Once a satellite is in GEO, it cannot return to Earth. Due to radiation hazards, human spacewalks are not workable in GEO. The RSGS demonstration will take place in GEO, and after the demonstration the RSGS will commercially operate in GEO. The RSGS spacecraft works autonomously because of radiations hazards and because it takes a long time for remote control signals to travel the distance between Earth and GEO.

The following Figure illustrates these three orbits in relationship to Earth.

Figure 13. Three Satellite Orbits in Relation to the Earth: LEO, GTO, and GEO



Source: DARPA.

As mentioned, demonstration of the RSGS capability will take place in GEO. GEO is a harsh and technically challenging environment for space operations (DARPA-PS-16-01, 2016). For instance, humans cannot survive in GEO due to radiation hazards. There are no commercial dexterous robotic capabilities in LEO, GTO or GEO. Therefore, RSGS will provide revolutionary dexterous robotic capabilities in GEO.

In April 2017, DARPA awarded an OT to SSL to build and demonstrate a Robotic Servicing Vehicle (RSV)—the RSGS spacecraft—that can autonomously repair military and commercial satellites in GEO (OT, 2017). The RSV is unmanned. The RSV comprises a spacecraft bus provided by SSL, a robotic payload (e.g., robotic arms and tools) provided by

DoD and a variety of other hardware and software provided by SSL and DoD. The RSV is illustrated in Chapter 1.

Under the OT, DARPA is contributing \$15 million in technical milestone payments, and SSL is paying for the RSGS bus and other services and items (RSGS OT, 2017). SSL is managing the OT work at its headquarters in Palo Alto, California. DoD is carrying out its share of the OT work at DARPA in Arlington, Virginia and at the Naval Research Laboratory in southwest Washington, D.C. DoD will fund the launch of the RSV in fiscal year 2023. Once in GEO, the RSV will be required to carry out a government demonstration mission. While the demonstration mission is not yet fully defined, DARPA will arrange for one or two demonstrations using U.S. government-owned satellites for RSV rendezvous, docking, and representative servicing tasks.

After successful completion of the government demonstration mission in GEO, ownership of the RSV will be transferred to SSL. SSL will then be able to commercially operate the RSV to inspect, service, repair, and reposition both government and commercial satellites (DARPA Update, 2017). At the end of its mission lifetime (an estimated fifteen years after launch), the RSV will be moved to a retirement orbit compliant with national standards (DARPA-PS-16-01, 2016). Thus, the RSGS program comprises two phases spanning fifteen years in GEO: a 6-9 month government (DARPA) demonstration phase followed by an approximately fourteen year commercial (SSL) operations phase. DARPA owns the RSV during the first phase, and SSL owns and operates the RSV in the second phase.

DoD expects to derive multiple benefits from the RSGS capability. RSGS is relevant to enhancing the mission effectiveness of U.S. military forces and supporting platforms, systems, components, or materials. RSGS promises to increase the robustness and resilience of the U.S.

space systems in GEO by potentially extending service life and enabling on-orbit modernization by providing four breakthrough technological capacities that can increase the security, reliability and technical performance of military satellites (DARPA-PS-16-01, 2016). These mission capabilities are: (1) detailed inspection of satellites; (2) assistance in repairs of failed deployment mechanisms such as apertures and solar arrays; (3) the install of new payloads such as weather sensors and neighborhood watch sensors on high-value assets; and (4) the re-location of space assets following divert maneuvers to avoid dangers (DARPA-PS-16-01, 2016). These four mission capabilities are illustrated in by Figure 1 in Chapter 1.

SSL expects to derive commercial benefits from its participation in the RSGS program. Specifically, after the government demonstration mission, which is anticipated to take no more than an estimated six to nine months, is completed successfully, SSL will own and operate the RSV. SSL will be able to use the RSV for providing inspection, repair, relocation, and upgrade services to both commercial and U.S. government-owned satellites (DARPA Update, 2017).

Summary of the RSGS Major Findings

Like for the organization interviews in Chapter 4, there are numerous major findings for the RSGS participant interviews, with several corresponding to each interview question. Appendix E provides the interview questions. The major findings also correspond to the five conceptual framework categories. The major findings are derived from the significant findings for the corresponding subsidiary interview questions. Appendix E also provides the subsidiary interview questions.

Thus, the first major findings are for Interview Question 1 and are based on the significant findings for each of the three subsidiary interview questions subsumed under Interview Question 1. The discussion below therefore summarizes the major findings according to the related interview question and the significant findings according to related subsidiary interview questions. The researcher uses the significant findings to derive the major findings. The following Table summarizes the major findings for the RSGS participant interviews corresponding to the related conceptual framework category and interview questions.

Table 27. Summary of the RSGS Case Study Major Findings

Conceptual Framework Category	Interview Questions	Major Findings
1. OT Award	1: 1a 1b 1c	OTs offer flexibility to draft OT terms and conditions to meet the needs of the parties. OTs offer the government the ability to accept funding from the OT contractor. OTs offer contractors flexibility to use commercial instead of FAR terms. The parties must give and take and reach consensus on important terms and conditions for OT negotiations to succeed. Mistrust between the parties can be a source of OT negotiation failure. Both sides must have people that are educated about OTs.
2. OT Advantages versus Traditional Procurement Agreements (TPAs)	2: 2a 2b 2c	OTs are more flexible than traditional procurement agreements because changing an OT is easier, and because the government can accept funding and in-kind contributions from the OT contractor. Fewer rules and regulations apply to OT compared to traditional procurement agreements. OTs enable organizations to do business with nontraditional contractors hesitant to work with the government.
3. OT Disadvantages versus TPAs	3: 3a 3b 3c	During OT negotiations, it can be uncertain what terms and conditions are mandatory to include in the agreement and what can be negotiated. There is a lack of OT expertise at some DoD organizations,

		and this can protract OT negotiations. Lack of OT expertise can also discourage program managers from being willing to use OTs. DoD organizations are culturally biased to continue to use what they are comfortable with, traditional procurement agreements. Fear of the unknown discourages organizations from using OTs. They will resist if you force them to do something they are not comfortable with such as use OTs.
4. Numbers of OTs versus TPAs	4: 4a 4b-c	Organizations with R&D missions may have higher numbers of OTs. Organizations with expertise in OTs may have higher numbers of OTs. Organizations that want more control over agreements may have higher numbers of traditional procurement agreements. The personnel resources, time, and creativity needed to negotiate and administer OTs may lead to higher numbers of traditional procurement agreements
5. What can be Changed	5: 5a 5b 5c	Greater emphasis on in-person, creative OT negotiations may impact organization use of OTs. Leadership-supported outreach to nontraditional contractors may impact organization use of OTs. Use of industry-specific OT templates may speed up OT negotiations, which also may impact organization use of OTs. DoD should consider the benefits to the commercial partner when negotiating OTs. DoD employees such as contracting officers are comfortable with procurement processes they understand, such as the FAR, and are uncomfortable to try new processes such as OTs. DoD employees will continue to be averse to using new procurement processes such as OTs unless they have employees around them that will help them become familiar with OTs.

Source: Author.

The following discussion reports the significant findings for the interview subsidiary questions in a narrative format, using extensive verbatim quotations from the participants' responses to the interview questions to convey their perspectives and opinions. The researcher

uses what he learns from these participant perspectives and opinions to derive the major findings for each of the five interview questions.

Major findings for interview question 1

Interview Question 1 is: What do participants believe are institutional and other factors that influence the decision to use an OT instead of a traditional procurement agreement?

Interview Question 1 includes three subsidiary interview questions:

- a) How does your organization determine to select an OT instead of a traditional procurement agreement such as a contract, grant or cooperative agreement?
- b) If you select an OT, what factors can influence negotiations to succeed?
- c) If you select an OT, what factors can influence OT negotiations to fail?

The significant findings for Interview Questions 1a-c are:

- a) OTs offer flexibility to draft OT terms and conditions to meet the needs of the parties. OTs offer the government the ability to accept funding from the OT contractor. OTs offer contractors the flexibility to use commercial instead of FAR terms. These factors positively impact the decision to select an OT instead of a traditional procurement agreement.
- b) In-person negotiations between the parties is a positive factor impacting successful OT negotiations. The parties must give and take and reach a beneficial consensus on important

terms and conditions for OT negotiations to succeed. Open communications and transparency between the parties are positive factors impacting successful OT negotiations.

- c) Mistrust between the parties can be a source of OT negotiation failure. Both sides must use people educated about OTs. Contracting officer workload on other agreements can be a source of OT negotiation failure. The DoD organization's OT template can be a source of OT negotiation failure if it differs from what the contractor expected and the DoD organization is willing to negotiate, for instance, for intellectual property rights.

The significant findings for Interview Questions 1a-c lead to the following major findings for Interview Question 1:

OTs offer flexibility to draft OT terms and conditions to meet the needs of the parties. OTs offer the government the ability to accept funding from the OT contractor. OTs offer contractors flexibility to use commercial instead of FAR terms. The parties must give and take and reach consensus on important terms and conditions for OT negotiations to succeed. Mistrust between the parties can be a source of OT negotiation failure. Both sides must have people educated about OTs.

The following discussion summarizes significant findings for Interview Questions 1a-1c.

Significant findings for interview question 1a

Interview Question 1a is: How does your organization determine to select an OT instead of a traditional procurement agreement such as a contract, grant, or cooperative agreement? Of the 5 case study participants interviewed:

- 3 of 5 (60%) participants discussed administrative factors potentially impacting whether to select an OT instead of a traditional procurement agreement.
- 2 of 5 (40%) participants discussed contractor factors potentially impacting whether their organization selects an OT instead of a traditional procurement agreement.
- 0 of 5 (0%) participants DoD-wide factors potentially impacting whether to select an OT instead of a traditional procurement agreement.
- 1 of 5 (20%) participants discussed legal and policy factors potentially impacting whether to select an OT instead of a traditional procurement agreement.
- 2 of 5 (40%) participants discussed organization factors potentially impacting whether to select an OT instead of a traditional procurement agreement.

Appendix CC provides more information on the factors discussed by case study participants for this interview question. The significant findings for Interview Question 1a are:

OTs offer flexibility to draft OT terms and conditions to meet the needs of the parties. OTs offer the government the ability to accept funding from the OT contractor. OTs offer contractors the

flexibility to use commercial instead of FAR terms. These factors impact the decision to select an OT instead of a traditional procurement agreement.

Some participant (3 of 5) discussed administrative factors impacting whether to select an OT instead of a traditional procurement agreement. Several DARPA participants discussed that an OT was selected for the RSGS project because it offered the most flexibility for drafting terms and conditions to meet the needs of the parties. For example, one participant discussed the need for flexibility to help the prospective OT contractor. “We needed something that allowed us the greatest amount of flexibility in writing terms and conditions that weren't going to be too obtrusive for this company or whoever we selected as the partner” (RSGS1).

Another DARPA participant discussed flexibility from the perspective of financial arrangements, explaining how OTs enable the government to accept funding from OT contractors. “We knew that we needed our commercial participant to contribute financially to the program . . . The OT seemed to be the most appropriate one . . . The ability to have much more flexible financial arrangements, for example, rather than the FAR-based cost proposal, I think it was significantly attractive to our potential partners” (RSGS2).

These types of flexibility are also attractive to OT contractors. In this regard, an SSL participant remarked, “I think what we liked about the [RSGS] OT was the flexibility to use commercial terms instead of a FAR-based contract. That was attractive to us” (RSGS5).

Significant findings for interview question 1b

Interview Question 1b is: If you select an OT, what factors can influence negotiations to succeed? Of the 5 case study participants interviewed:

- 1 of 5 (20%) participants discussed contractor factors potentially influencing OT negotiations to succeed.
- 5 of 5 (100%) participants discussed joint organization and contractor factors potentially influencing OT negotiations to succeed.
- 2 of 5 (40%) participants discussed legal and policy factors potentially influencing OT negotiations to succeed.
- 0 of 5 (0%) participants discussed organization factors potentially influencing OT negotiations to succeed.

Appendix CC provides more information on the factors discussed by case study participants for this interview question. The significant findings for Interview Question 1b are:

In-person negotiations between the parties is a positive factor impacting successful OT negotiations. The parties must give and take and reach consensus on essential terms and conditions for OT negotiations to succeed. Open communications and transparency between the parties are positive factors impacting successful OT negotiations.

All participants (5 of 5) discussed joint organization and contractor factors influencing OT negotiations to succeed. For example, a DARPA participant discussed how in-person negotiations with the OT contractor (SSL) were enhanced by displaying the draft agreement on a large projector screen and talking through each of the terms and conditions. The negotiation included people with authority to bind their side of the OT agreement. “We had enough people there with authority who could make decisions or at least could articulate, understand what our position was and take it back to whoever was the higher authority and explain and get us a quicker response as to whether or not they could accept it” (RSGS1).

This joint approach to negotiating the OT terms and conditions paid dividends when the parties were working on the payment terms and conditions. As another DARPA participant discussed, the parties worked together to create an incentive payment schedule that meets the needs of SSL, the OT contractor. “We had not expected to start these incentive payments quite as early as we wound up doing, but it was something that we accommodated . . . The fact that the partner understood going into the negotiations that it was going to be an OT, what was expected of them, and in our case, it was to build a satellite at their own expense and provide it as part of this project, then create a workable joint management partnership structure” (RSGS2).

Another DARPA participant described the successful RSGS OT negotiations being akin to a marriage in terms of the give and take needed between the parties. “Both sides have to be in agreement, and what we found during those negotiations is there were things that we could agree on, and there's things that we wanted, and we had to pay for, they wanted, they had to pay for . . . We would come to a consensus between the eventual partners, like a marriage” (RSGS3).

An added DARPA participant discussed the atmosphere of openness between the parties during OT negotiations. “With RSGS, it was all out in the open. I don't think that the contractor

ever felt like something was hidden from them. I think that they knew the whole time, this was what the government presenting . . . It was all open, and it was very flexible” (RSGS4).

An SSL participant praised the positive negotiation styles of the parties as a factor contributing to successful OT negotiations. “For us, I guess it was just because I think you guys [the DARPA team] are easygoing on things and we are too. My negotiation style is we want to get the best outcome that each party can live with or be happy with. Not live with, be happy with it” (RSGS5).

Significant findings for interview question 1c

Interview Question 1c is: If you select an OT, what factors can influence negotiations to fail? Of the 5 case study participants interviewed:

- 1 of 5 (20%) participants discussed contractor factors potentially influencing OT negotiations to fail.
- 2 of 5 (40%) participants discussed joint organization and contractor factors potentially impacting OT negotiations to fail.
- 1 of 5 (20%) participants discussed legal and policy factors potentially influencing OT negotiations to fail.
- 2 of 5 (40%) participants discussed organization factors potentially influencing OT negotiations to fail.

Appendix CC provides more information on the factors discussed by case study participants for this interview question. The significant findings for Interview Question 1c are:

Mistrust between the parties can be a source of OT negotiation failure. Both sides must use people educated about OTs. Contracting officer workload on other agreements can be a source of OT negotiation failure. The DoD organization's OT template can be a source of OT negotiation failure if it differs from what the contractor expected and the DoD organization is willing to negotiate, for instance, for intellectual property rights.

Some participants (2 of 5) discussed joint organization and contractor factors impacting OT negotiations to fail. A DARPA participant, for instance, explained that mistrust between the parties could be a source of negotiation failure. The participant portrayed this factor in terms of how DARPA and SSL addressed adding satellite refueling capability for the RSGS spacecraft. "They [SSL] wanted to add refueling as part of the negotiations . . . We told them they could do refueling, but it was at their cost. Any modifications and changes would be at their cost, and they agreed to it. If they hadn't agreed to it, and wanted us to pay for some, that would have been a deal breaker" (RSGS3).

Another DARPA participant discussed needing to have experienced people involved in the negotiations that understand OTs. "I think if you have people who don't know what they're doing, they can mess up the negotiations for an OT. If you have people who are afraid to pursue something when maybe, it's not clear to them; that can mess things up" (RSGS4).

Some participants (2 of 5) also discussed organization factors influencing OT negotiations to fail. For example, a DARPA participant explained how the contracting officer's

heavy workload on other contracting work could impact OT negotiations. “It [OT negotiations] was a really big effort and, there was a lot of moving parts. And the contracting officer had a lot on his plate that wasn't RSGS. So, probably juggling everything he had was distracting . . . You have deadlines you have to meet for all of your clients” (RSGS4).

From a different perspective, an SSL participant discussed how DARPA's OT template initially gave SSL a misleading impression that DARPA wanted to take SSL's intellectual property rights. This impression turned out to be unfounded, but it could have been a source of OT failure. “I think the one thing we weren't sure about going into the negotiation was . . . The [OT] contract template that was circulated, I think does not quite reflect what DARPA's desires were. And so, we were a little bit concerned before we went in” (RSGS5).

Major findings for interview question 2

Interview Question 2 is: What do participants believe are the advantages of OTs compared to traditional procurement agreements? Interview Question 2 includes three subsidiary interview questions:

- a) What are the advantages of using OTs compared to traditional procurement agreements such as contracts, grants, and cooperative agreements?
- b) How do the advantages of OTs impact use of OTs in your organization?
- c) How do the advantages of OTs impact use of OTs in other DoD organizations?

The significant findings for Interview Questions 2a-c are:

- a) OTs are more flexible than traditional procurement agreements because changing the OT is easier and because the government can accept funding and in-kind contributions from the OT contractor. Fewer rules and regulations apply to OT compared to traditional procurement agreements. OTs enable the parties to use commercial terms and conditions, which helps contractors unfamiliar with federal procurement regulations.
- b) OTs enable organizations to change standard terms and conditions to meet the contractor's business needs. Organizations experienced with OTs build up a comfort level with them that encourages wider use. OTs enable organizations to do business with nontraditional contractors that are hesitant to work with the government.
- c) OTs are suitable to DoD organizations for attracting commercial contractors to do business with DoD organizations. The success of the RSGS program will help spread the word to other DoD organizations about the benefits of OTs. DoD organizations need to be educated about OTs to use them more widely.

The significant findings for Interview Questions 2a-c lead to the following major findings for Interview Question 2:

OTs are more flexible than traditional procurement agreements because changing an OT is easier, and because the government can accept funding and in-kind contributions from the OT contractor. Fewer rules and regulations apply to OT compared to traditional procurement agreements. OTs enable organizations to do business with nontraditional contractors hesitant to work with the government.

The following discussion summarizes significant findings for Interview Questions 2a-c.

Significant findings for interview question 2a

Interview Question 2a is: What are the advantages of using OTs compared to traditional procurement agreements such as contracts, grants, and cooperative agreements? Of the 5 case study participants interviewed:

- 5 of 5 (100%) participants discussed flexibility advantages of OTs compared to traditional procurement agreements.
- 1 of 5 (20%) participants discussed speed and efficiency advantages of OTs compared to traditional procurement agreements.
- 2 of 5 (40%) participants discussed organization advantages of OTs compared to traditional procurement agreements.
- 1 of 5 (20%) participants discussed contractor advantages of OTs compared to traditional procurement agreements.

Appendix CC provides more information on the factors discussed by case study participants for this interview question. The significant findings for Interview Question 2a are:

OTs are more flexible than traditional procurement agreements because changing an OT is easier and because the government can accept funding and in-kind contributions from the OT

contractor. Fewer rules and regulations apply to OT compared to traditional procurement agreements. OTs enable the parties to use commercial terms and conditions, which helps contractors unfamiliar with federal procurement regulations.

All participants (5 of 5) discussed flexibility advantages of OTs compared to traditional procurement agreements. For example, a DARPA participant explained the benefits associated with not having to follow standard federal procurement regulations concerning cost accounting and intellectual property. “You don't have to worry about somebody's cost accounting rules. Some intellectual property, we try to use some same terms as DFARS, but you can also then go a little off or write it more specialized IP terms” (RSGS1).

Another DARPA participant discussed flexibility regarding being able to make changes to the OT work without extensive paperwork or administrative burdens. The same participant also explained an advantage for the government is being able to receive funding or in-kind contributions from the OT contractor. The participant discussed how these advantages helped the RSGS program. “One advantage [of OTs] is the ability to receive funds or contributions from non-government entities. Or in-kind. The ability to make changes without an extensive amount of paperwork and admin” (RSGS2). The same participant also contrasted OTs to traditional procurement agreements, discussing where each type of agreement is the most useful. “I would say the more complex the interaction, the more an OT makes sense. If it's very cut and dried—go build me this satellite—then I think a [traditional procurement] contract works out great. Grants, of course, are great for university research, open-ended, deliverables” (RSGS2).

An additional DARPA participant discussed flexibility advantages of OTs from the perspective of the fewer rules and regulations that apply to OTs compared to traditional

procurement agreements. “There's so many rules and regulations in [a] traditional [contract] that make it really hard to be successful in a partnership. OTs allow more flexibility” (RSGS3).

Another DARPA participant reflected on this theme, noting that there is less bureaucracy associated with OTs compared to traditional procurement agreements. This enables the parties to negotiate an agreement that meets the government's and the contractor's needs. “I think a traditional procurement agreement probably has a lot red tape wrapped around it that contractors don't understand . . . They're not unfriendly terms, but they're not understandable by every contractor . . . OTs are so flexible . . . All of the parties should be satisfied with what the outcome is going to be when you use an OT” (RSGS4).

A participant from SSL remarked how OTs and commercial contracts take about the same time to negotiate, but that an advantage of OTs is that they enable commercial terms and conditions. “I think the flexibility and the ability to use the commercial terms as I said before is very attractive. I don't negotiate the FAR contracts, so I don't have a concept of that. But I think in terms of with our commercial practice, I will say [OT negotiation time] it's probably the same” (RSGS5).

Significant findings for interview question 2b

Interview Question 2b is: How do the advantages of OTs impact use of OTs in your organization? Of the 5 case study participants interviewed:

- 4 of 5 (80%) participants discussed organization impacts on the participant's organization.

- 1 of 5 (20%) participants discussed collaborative organization-contractor impacts on the participant's organization.
- 0 of 5 (0%) participants discussed speed and efficiency impacts on the participant's organization.
- 2 of 5 (40%) participants discussed contractor impacts on the participant's organization.

Appendix CC provides more information on the factors discussed by case study participants for this interview question. The significant findings for Interview Question 2b are: OTs enable organizations to change standard terms and conditions to meet the contractor's business needs. Organizations experienced with OTs build up a comfort level with them that encourages their wider use. OTs enable organizations to do business with nontraditional contractors hesitant to work with the government.

The large majority of participants (4 of 5) discussed impacts of OT advantages on the participant's organization. One organization-related advantage noted by a DARPA participant is the ability to consolidate and modify intellectual property terms and conditions to help OT negotiations. "We learn through some of these [OT] negotiations where we keep running into problems, we start to then try to massage the language . . . To consolidate the patent and the IP rules, so they try to make it a little cleaner" (RSGS1). Another DARPA participant discussed how the organization has learned lessons from past OTs and applied them to the RSGS OT, for instance, about intellectual property rights for the government.

If you look at the Orbital Express Program, which was a completely successful space demonstration in 2007, that was an OT between DARPA and Boeing . . . Some of the key software was then their [Boeing] IP. It wasn't available for wider use. That was one of

the reasons that we made it clear in our OT for RSGS that that wasn't going to be okay. At least the government developed stuff was going to be widely available (RSGS2).

An added DARPA participant discussed how TTO is comfortable doing OTs, and that this comfort level leads to more OTs. “I think [the DARPA] Tactical Technology Office uses them relatively frequently. The Experimental Spaceplane (XS-P) program is another very large OT that we're doing, again with Boeing. I think we're pretty comfortable with them . . . [OTs] seems to give a larger umbrella to be able to go do something cooperatively” (RSGS3).

A DARPA participant explained how OTs enable DARPA to do business with contractors hesitant to business with DoD.

We get all the industry players that we want. We get people who are afraid of working with the government. We get people who are afraid of having the government in their books, looking at what they're doing . . . We keep all of those fears at bay when we use something like an OT. It's non-invasive. They [hesitant contractors] get to do research that they maybe wouldn't have funding to do. And we get the benefit of that (RSGS4).

The same participant, however, also discussed how DARPA is concerned about misusing OTs, and that this calls for education about how to use OTs. “We are deathly afraid of losing the OT authority because it was misused. People have to be educated on how to use it properly to protect everybody being able to use it. Especially, DARPA because, I think it is critical to a lot of the research opportunities that we want right now” (RSGS4).

Significant findings for interview question 2c

Interview Question 2c is: How do the advantages of OTs impact use of OTs in other DoD organizations? Of the 5 case study participants interviewed:

- 1 of 5 (20%) participants discussed flexibility impacts of OTs on other DoD organizations.
- 1 of 5 (20%) participants discussed speed and efficiency impacts of OTs on other DoD organizations.
- 5 of 5 (100%) participants discussed DoD-wide impacts of OTs on other DoD organizations.
- 1 of 5 (20%) participants discussed contractor impacts of OTs on other DoD organizations.

Appendix CC provides more information on the factors discussed by case study participants for this interview question. The significant findings for Interview Question 2c are:

OTs are suitable to DoD organizations for attracting commercial contractors to do business with DoD organizations. The success of the RSGS program will help spread the word to other DoD organizations about the benefits of OTs. DoD organizations need to be educated about OTs to use them more widely.

All participants (5 of 5) discussed flexibility impacts of OTs on other DoD organizations. For example, a DARPA participant explained what he has heard other people say about the Army's DOTC consortium OT. "I've heard some of the people talking about it [the Army DOTC OT], and of course, there's some criticism of it. But I think people are at least encouraged that other contracting shops are trying something new" (RSGS1).

Another DARPA participant discussed how success of the RSGS OT could encourage other DoD organizations to become familiar with and use OTs. "Actually, that's one of the reasons that I think RSGS is so important. If we not only get technical success, but we show that

the partnership is a real thing, and it works, then I think it will motivate people to become more familiar with this method of procurement” (RSGS2). Still another DARPA participant discussed that OTs are for specific purposes, and that some DoD organizations may not be innovative enough to leverage OTs for their organizations.

It seems like everything that I've seen from Air Force, and maybe just from working at DARPA, years ago, is that they [OTs] have a specific purpose in order to make an award. They only make that award for that specific purpose, not necessarily the research labs, but the organizations themselves . . . I'm not sure that they are able to think outside of the box in order to get items that meet their requirements (RSGS3).

Another DARPA participant believed that OTs will be more widely used across DoD only when organizations are educated on how to use them (RSGS4). A participant from SSL discussed how SSL is having difficulty negotiating commercial-type agreements with government organizations other than DARPA corroborated this belief. "I've been trying to do a commercial arrangement with other quasi-government institutions, and I'm finding it more difficult than working with DARPA” (RSGS5).

Major findings for interview question 3

Interview Question 3 is: What do participants believe are the disadvantages of OTs compared to traditional procurement agreements? Interview Question 3 includes three subsidiary interview questions:

- a) What are the disadvantages of using OTs compared to traditional procurement agreements such as contracts, grants, and cooperative agreements?

- b) How do the disadvantages of OTs impact use of OTs in your organization?
- c) How do the disadvantages of OTs impact use of OTs in other DoD organizations?

The significant findings for Interview Questions 3a-c are:

- a) During OT negotiations, it is uncertain to the parties what terms and conditions are mandatory to include in the agreement and what terms and conditions can be negotiated. There are no specific guidelines on terms and conditions required in an OT, and this can cause negotiations being protracted because the parties have to discuss all terms and conditions.
- b) There is a lack of OT expertise at some DoD organizations, and this can cause OT negotiations to be protracted. This lack can also discourage program managers from being willing to use OTs. It can also be challenging to negotiate the government's and contractor's cost share in an OT.
- c) DoD organizations are culturally biased to continue to use what they are comfortable with—traditional procurement agreements. Fear of the unknown discourages organizations from using OTs. They will resist if you force them to do something they are not comfortable with such as use OTs. OTs make sense when there is a dual-use commercial marketplace benefit for the OT contractor. Weapons system procurements rarely offer dual-use commercial marketplace benefits to contractors.

The significant findings for Interview Questions 3a-c lead to the following major findings for Interview Question 3:

During OT negotiations, it can be uncertain what terms and conditions are mandatory to include in the agreement and what can be negotiated. There is a lack of OT expertise at some DOD organizations, and this can protract OT negotiations. Lack of OT expertise can also discourage program managers from being willing to use OTs. DoD organizations are culturally biased to continue to use what they are comfortable with—traditional procurement agreements. Fear of the unknown discourages organizations from using OTs. They will resist if you force them to do something they are not comfortable with such as use OTs.

The following discussion summarizes significant findings for Interview Questions 3a-c.

Significant findings for interview question 3a

Interview Question 3a is: What are the disadvantages of using OTs compared to traditional procurement agreements such as contracts, grants, and cooperative agreements? Of the 5 case study participants interviewed:

- 1 of 5 (20%) participants discussed experience disadvantages of OTs compared to traditional procurement agreements.
- 4 of 5 (80%) participants discussed OT negotiation and administration disadvantages of OTs compared to traditional procurement agreements.
- 2 of 5 (40%) participants discussed culture disadvantages of OTs compared traditional procurement agreements.

Appendix CC provides more information on the factors discussed by case study participants for this interview question. The significant findings for Interview Question 3a are:

During OT negotiations, it is uncertain to the parties what terms and conditions are mandatory to include in the agreement and what terms and conditions can be negotiated. There are no specific guidelines on terms and conditions required in an OT, and this can cause negotiations to be protracted because the parties have to discuss all terms and conditions.

The large majority of participants (4 of 5) discussed OT negotiation and administration disadvantages of OTs compared to traditional procurement agreements. For example, a DARPA participant discussed that a disadvantage of OTs is being unsure where the legal line is between what can and cannot be negotiated. “I don't know some of the case law behind things, so I don't know how far I can or cannot negotiate something . . . I don't know precisely where I should draw the line. I usually have to go find . . . People who are experts on that to explain how far I can go” (RSGS1).

Another DARPA participant also discussed the disadvantages of OTs arising from the lack of specific guidelines on what must be included in the agreement, which results in having to consider everything with the OT contractor. “So, there's no book you can point to say, hey, you have to follow the FAR . . . That's a disadvantage. You can't point to something when you need something done. You have to [have] discussions” (RSGS3).

An added DARPA participant took a more balanced view of the lack of OT guidelines, noting that it cuts both ways. The lack of guidelines can be a disadvantage or an advantage depending on what you want to carry out with the agreement.

I don't see where they'd [OTs] fall short of a traditional procurement agreement. They're different . . . You're using an OT because the traditional procurement route doesn't work for you, or the arrangement that you want. So, you're using an OT to entice somebody to do business with you that doesn't want to go the traditional procurement route. Or, you're using the OT because of the flexibility it gives you over what the traditional procurement route would give you. It's the same thing with the traditional procurement. The disadvantages aren't really disadvantages (RSGS4).

A participant from SSL discussed how during OT negotiations the parties have to be careful to make sure that all the important terms and conditions are included in the OT because there are no lists of standardized terms and conditions included in the agreement. “In a FAR agreement, you have a tick box of all the things you'll need to have in there . . . So [for an OT], just making sure that you tick the box on all the things that you need” (RSGS5).

Significant findings for interview question 3b

Interview Question 3b is: How do the disadvantages of OTs impact use of OTs in your organization? Of the 5 case study participants interviewed:

- 1 of 5 (20%) participants discussed organization experience of OT disadvantages.
- 3 of 5 (60%) participants discussed organization negotiation and administration impacts of OT disadvantages.
- 1 of 5 (20%) participants discussed organization culture impacts of OT disadvantages.

Appendix CC provides more information on the factors discussed by case study participants for this interview question. The significant findings for Interview Question 3b are:

There is a lack of OT expertise at some DoD organizations, and this can cause OT negotiations to be protracted. This can also discourage program managers from being willing to use OTs. It can also be challenging to negotiate the government and contractor cost shares in an OT.

Some participants (3 of 5) discussed organization negotiation and administration impacts of OT disadvantages. For example, a DARPA participant discussed how the lack of expertise about OTs at some DoD organizations can end up making OT negotiations being more protracted than traditional procurement agreements. Lack of OT expertise can cause program managers to be averse to using OTs. “It draws out the negotiation process . . . To the point that I think a lot of people who are not familiar with them, like some program engineers may not like them if they see this track record of them taking longer than a normal FAR-based contract to get an award . . . Sometimes that discourages program managers” (RSGS1).

Another DARPA participant also discussed how the protracted nature of OT negotiations could be a disincentive to using OTs instead of traditional procurement agreements. “We worked on that [OT] for months just to get it out. We thought originally that we could be faster than a traditional . . . FAR-based contract. At the end of the day, we were probably wrong . . . I think the formulation phase is grueling and maybe a disincentive in some cases” (RSG2).

An SSL participant discussed the challenges of negotiating the contractor cost share for program OTs.

Well, because we're so interested in satellite servicing business that the cost share, we were definitely willing to do it in this instance [RSGS program]. There was another OT that came through . . . For a smaller amount like a \$5 million contract . . . I was helping our contracts person review that. That was a little bit harder; I think they were trying to figure out if they could do a cost share or how it works. I think it's really dependent on the type of project (RSGS5).

Significant findings for interview question 3c

Interview Question 3c is: How do the disadvantages of OTs impact use of OTs in other DoD organizations? Of the 5 case study participants interviewed:

- 3 of 5 (60%) participants discussed DoD experience impacts of OT disadvantages.
- 1 of 5 (20%) participants discussed DoD negotiation and administration impacts of OT disadvantages.
- 5 of 5 (100%) participants discussed DoD culture impacts of OT disadvantages.

Appendix CC provides more information on the factors discussed by case study participants for this interview question. The significant findings for Interview Question 3c are:

DoD organizations are culturally biased to continue to use what they are comfortable with—traditional procurement agreements. Fear of the unknown discourages organizations from using OTs. They will resist if you force them to use something they are not comfortable with such as OTs. OTs make sense when there is a dual-use commercial marketplace benefit for the OT

contractor. Weapons systems procurements rarely offer dual-use commercial marketplace benefits to contractors.

All participants (5 of 5) discussed DoD culture impacts of OT disadvantages. A DARPA participant discussed the general lack of expertise about OTs means that contractors continue to use what they are comfortable with, traditional procurement agreements. “The traditional defense contractors are so used to dealing with the FAR, DFARS . . . They understand what's expected of them, so they are comfortable with that. I think sometimes what discourages people from OTs is just the whole discomfort of the unknown and getting through that process and relearning a new acquisition technique” (RSGS1).

Another DARPA participant discussed how the RSGS program and DARPA are unique when it comes to OTs. Not all DoD organizations are as positive about OTs and willing to use them instead of traditional procurement agreements. “The day I came to DARPA, the Director and the Deputy Director of [the] Contracts Management Office sat down with me. They said we're really excited about what you're here to do [RSGS] . . . We'll do anything we can to help you. I don't think anywhere else in the DoD world you're going to hear those words” (RSGS2).

The same participant also discussed how DoD procurement culture is biased towards supporting the procurement of weapons systems rather than advanced R&D projects. The participant contrasted this cultural bias with the dual-use (military and commercial) aspects of the RSGS program.

A lot of it comes down to DoD builds things like weapons. Well, there's not a big commercial market for tanks and submarines, so those are not places where you should have OTs . . . If you can identify that outside of DoD market, then this stuff [OTs] all

starts to make a lot more sense. In a lot of the things that I know that DoD procures, it's not necessarily clear that there is that dual use, dual market kind of thing (RSGS2).

Another DARPA participant discussed the challenges of getting DoD organizations to think out of the box in ways to further use OTs. “It seems like everything that I've seen from Air Force, and maybe just from working at DARPA, years ago, is that they have a specific purpose in order to make an award . . . So, everything needs to be put in a nice little box. I'm not sure that they are able to think outside of the box in order to get items that meet their requirements” (RSGS3). Similarly, a participant from SSL discussed that government contracting officers tend to stick to what they are comfortable with, and that does not include OTs. “I think just from my own limited experience dealing with certain contracting officers, they kind of know what they know in their box. If you try to force someone out of their box, then they are not comfortable with that” (RSGS5).

Major findings for interview question 4

Interview Question 4 is: What do participants believe explains DoD's numbers of OTs compared to traditional procurement agreements? Interview Question 4 includes three subsidiary interview questions:

- a) What factors in your organization help explain the number of OTs executed compared to traditional procurement agreements such as contracts, grants, and cooperative agreements?
- b) What DoD-wide factors help explain the numbers of OTs compared to traditional procurement agreements?

- c) What other factors help explain the numbers of OTs compared to traditional procurement agreements?

As discussed in Chapter 4, during the case study interviews, some participant responses to subsidiary Interview Questions 4b and 4c were redundant. The researcher combines the participant responses to subsidiary Interview Questions 4b and 4c. The significant findings of subsidiary Interview Questions 4b and 4c are also combined, and both are discussed below under subsidiary Interview Question 4b. The significant findings for Interview Questions 4a-b/c are:

- a) Organizations with R&D missions may have relatively higher numbers of OTs.

Organizations with expertise in OTs may have relatively higher numbers of OTs.

Organizations that want more control over agreements may have relatively higher numbers of traditional procurement agreements. The personnel resources, time, and creativity needed to negotiate and administer OTs may lead to relatively higher numbers of traditional procurement agreements. For contractors, the numbers of OTs are associated with the business case supporting each OT.

- b) The lack of familiarity with OTs is a DoD-wide factor that explains the low numbers of OTs.

There is also a lack of out-of-the-box thinking at DoD organizations that may contribute to the low numbers of OTs.

The significant findings for Interview Questions 4a-b/c lead to the following major findings for Interview Question 4:

Organizations with R&D missions may have higher numbers of OTs. Organizations with expertise in OTs may have higher numbers of OTs. Organizations that want more control over agreements may have higher numbers of traditional procurement agreements. The personnel resources, time, and creativity needed to negotiate and administer OTs may lead to higher numbers of traditional procurement agreements.

The following discussion summarizes significant findings for Interview Questions 4a-b/c.

Significant findings for interview question 4a

Interview Question 4a is: What factors in your organization help explain the number of OTs executed compared to traditional procurement agreements such as contracts, grants, and cooperative agreements? Of the 5 case study participants interviewed:

- 1 of 5 (20%) participants discussed organization experience factors potentially explaining the numbers of OTs compared to traditional procurement agreements.
- 2 of 5 (40%) participants discussed OT negotiation and administration factors potentially explaining the numbers of OTs compared to traditional procurement agreements.
- 5 of 5 (100%) participants discussed organization culture factors potentially explaining the numbers of OTs compared to traditional procurement agreements.

Appendix CC provides more information on the factors discussed by participants for this interview question. The significant findings for Interview Question 4a are:

Organizations with R&D missions may have higher numbers of OTs. Organizations with expertise in OTs may have higher numbers of OTs. Organizations that want more control over agreements may have higher numbers of traditional procurement agreements. The personnel resources, time, and creativity needed to negotiate and administer OTs may lead to higher numbers of traditional procurement agreements. For contractors, their numbers of OTs are associated with the business case supporting each OT.

All participants (5 of 5) discussed organization culture factors potentially explaining the numbers of OTs compared to traditional procurement agreements. A DARPA participant, for instance, associated the willingness of an organization to use OTs—and corresponding higher numbers of OTs—with whether the organization has a R&D mission. “As an R&D agency, of course, we recognize the need to reach out to any and everybody for these ideas, and so we're willing to accept that risk of negotiating something unusual if that means we can capture research that would not have come to DoD at all, because people just don't want to deal with the government” (RSGS1). The same participant also compared the expertise of DARPA contracting employees to those at other DoD organizations, for instance, at contracting agents. “A lot of why we probably do more [OTs], just because we have . . . A lot of these other expertise people have done them enough that they feel comfortable and are willing to do it or in some cases, because other people won't do them . . . They come back to us . . . Because we have the knowledge how to do them” (RSGS1).

Another DARPA participant responded to this interview question from an efficiency perspective, discussing how the personnel resources and time needed to be dedicated to

negotiating the RSGS OT may help explain why there are low numbers of OTs in the organization.

One of the things might be efficiency. In other words, during my [RSGS OT] negotiations, the contract's management office had four people staffing the negotiations, staffing the oral arguments that the contractor made and that sort of thing. The development of the solicitation that resulted in the [RSGS] OT was also very time-consuming because it's different, because it's novel, and that sort of thing. I think [with traditional procurement] contracts, there's a process. People know how to do the process. There's rules. You can just go look up the rules and that sort of thing . . . It's just more cut and dry than the OT, [which] requires creativity (RSGS2).

Another DARPA participant attributed the low numbers of OTs at DARPA to the “iron fist,” meaning the organization's wish to control the negotiation and administration of all aspects of agreements. Traditional procurement agreements enable more control—an iron fist—over these processes than OTs (RSGS3). The same participant, however, also believed the numbers of OTs will increase over time as people become more familiar with them: “As long as there's somebody that has the determination and drive to continue to use OTs and change people's perception of an OT. Over time, as more become implemented, that'll be better understood” (RSGS3).

Still another DARPA participant identified institutional bias—employee comfort level with traditional procurement agreements—as a factor supporting more traditional procurement agreements than OTs. This factor may also apply to traditional contractors.

I think a lot of people get into contracting, and you could probably do some of it in your sleep. So, there's a comfort level in doing what you know. And, it's hard to see something that you really don't know about, and you haven't been educated properly about. And think, this is a better route for me to go. And one I could use more frequently if I wanted too. Maybe the performers that we work with a lot. Maybe it's the same thing, but on the industry side. It's routine. We know what paperwork we need from you, and that's what we want. So, yeah, institutional bias to that as well (RSGS4).

A participant from SSL discussed the relative numbers of OTs from the perspective of whether individual OTs present a good business case for the company. “We wanted to work on this [RSGS] program, and that was what was offered by [DARPA], and we're willing to make the investment for the [RSGS robotic] servicing . . . That was definitely acceptable, and for us, worth pursuing” (RSGS5).

Significant findings for interview questions 4b-c

Interview Question 4b is: What DoD-wide factors help explain the numbers of OTs compared to traditional procurement agreements? Of the 5 case study participants interviewed:

- 0 of 5 (0%) participants discussed DoD experience factors potentially explaining the numbers of OTs compared to traditional procurement agreements.
- 1 of 5 (20%) participants discussed OT negotiation and administration factors potentially explaining the numbers of OTs compared to traditional procurement agreements.
- 3 of 5 (60%) participants discussed DoD culture factors potentially explaining the numbers of OTs compared to traditional procurement agreements.

Appendix CC provides more information on the factors discussed by participants for this interview question. The significant findings for Interview Question 4b-c are:

The lack of familiarity with OTs is a DoD-wide factor that explains the low numbers of OTs. There is also a lack of out-of-the-box thinking at DoD organizations that may contribute to the low numbers of OTs.

Some participants (3 of 5) discussed DoD culture factors potentially explaining the numbers of OTs compared to traditional procurement agreements. A DARPA participant, for example, considered familiarity with OTs as a factor possibly explaining the low DoD-wide numbers of OT compared to traditional procurement agreements. “It's just familiarity. Even if people try to do it [an OT], and then it's reflected that gee, this was a lot of work. The rest of the [DoD procurement] community probably hears that, and it's a little bit of a disincentive” (RSGS2). Another DARPA participant attributed the low numbers of OTs across DoD to the lack of out-of-the-box thinking. “Although at DARPA . . . We have more out-of-the-box thinking here in general, I think it just gets worse as you step into the big DoD” (RSGS3). Similarly, an SSL participant discussed unfamiliarity with OTs, and lack of delegated OT authority, as potential factors explaining the relatively low numbers of OTs, DoD-wide. “I really think it's the unfamiliarity. My understanding is that OTs require congressional approval” (RSGS5).

Major findings for interview question 5

Interview Question 5 is: What do participants believe are factors that could be changed to impact DoD use of OTs? Interview Question 5 includes three subsidiary interview questions:

- a) What factors in your organization could be changed to impact use of OTs?
- b) What DoD-wide factors could be changed to impact use of OTs?
- c) What factors do you believe are resistant to change, but if changed, would impact use of OTs?

The significant findings for Interview Questions 5a-c are:

- a) Greater emphasis on in-person, creative OT negotiations may impact organization use of OTs. Leadership-supported outreach to nontraditional contractors may impact organization use of OTs. Use of industry-specific OT templates may speed up OT negotiations, which also may impact organization use of OTs. Interactive OT training for organization senior employees may impact organization use of OTs.
- b) DoD should consider the benefits to the commercial partner when negotiating OTs. DoD should be careful in using OTs lest Congress take away OT authority. DoD should guide contractors on what types of non-monetary contributions that contractors can provide to satisfy the cost-share requirements of OTs.
- c) DoD employees such as contracting officers are comfortable with procurement processes they understand, such as the FAR, and are uncomfortable to try new processes such as OTs. DoD employees will continue to be averse to using new procurement processes such as OTs unless they have employees around them that will help them become familiar with OTs. DoD employees don't understand where the line is between what can and cannot be negotiated in OTs.

The significant findings for Interview Questions 5a-c lead to the following major findings for Interview Question 5:

Greater emphasis on in-person, creative OT negotiations may impact organization use of OTs. Leadership-supported outreach to nontraditional contractors may impact organization use of OTs. Use of industry-specific OT templates may speed up OT negotiations, which also may impact organization use of OTs. DoD should consider the benefits to the commercial partner when negotiating OTs. DoD employees such as contracting officers are comfortable with procurement processes they understand—such as the FAR—and are uncomfortable to try new processes such as OTs. DoD employees will continue to be averse to using new procurement processes such as OTs unless they have employees around them that will help them become familiar with OTs.

The following discussion summarizes significant findings for Interview Questions 5a-c.

Significant findings for interview question 5a

Interview Question 5a is: What factors in your organization could be changed to impact use of OTs? Of the 5 case study participants interviewed:

- 1 of 5 (20%) participants discussed employee factors that could be changed to potentially impact organization use of OTs.
- 3 of 5 (60%) participants discussed leadership and oversight factors that could be changed to potentially impact organization use of OTs.

- 3 of 5 (60%) participants discussed training and communication factors that could be changed to potentially impact organization use of OTs.

Appendix CC provides more information on the factors discussed by participants for this interview question. The significant findings for Interview Question 5a are:

Greater emphasis on in-person, creative OT negotiations may impact organization use of OTs. Leadership-supported outreach to nontraditional contractors may impact organization use of OTs. Use of industry-specific OT templates may speed up OT negotiations, which also may impact organization use of OTs. Interactive OT training for senior organization employees may impact organization use of OTs.

A majority of participants (3 of 5) discussed leadership and oversight factors that could be changed to impact organization use of OTs. One DARPA participant, for instance, explained how more in-person OT negotiations would reduce the time needed to get an OT awarded. “I do think from an award perspective we may need to do more face-to-face negotiating if we want to get them awarded faster” (RSGS1). The same participant also discussed how industry-specific OT templates could be used to spur wider organization use of OTs. “Maybe if we put more with industry, put out the templates somewhere and said, okay, here's the standard template” (RSGS1). The same participant discussed how customized OT templates could shave time off the current OT negotiation timeline, which involves many back-and-forth negotiations between the parties over specific issues, for instance, intellectual property issues.

Another DARPA participant discussed that increased outreach to nontraditional contractors, and leadership support for outreach, might increase organization use of OTs.

Coming down from a higher-up [leadership] maybe that we're going to make a point to use these [OTs] more. What we're doing with our research announcements, where we are actively reaching out to these nontraditionals? . . . So, it's the PMs [who] are doing the outreach. Everybody . . . Needs to be onboard with actually, doing the OTs that the nontraditionals want. Because we want their research. So, we have to be willing to accommodate them when it comes to contracting. Keep on reaching out to the nontraditionals (RSGS4).

An SSL participant discussed how more creative thinking on what makes up the OT contractor's cost share (contribution) might increase organization use of OTs. The participant framed this discussion as a business finance issue in the successful collaboration between SSL and DARPA during the RSGS OT negotiations. "Once we got into the room and you [DARPA] were so flexible . . . We were able to think creatively together. The collaboration, I think, was really great" (RSGS5).

A majority of participants (3 of 5) also discussed training and communication factors that could be changed to impact organization use of OTs. For example, a DARPA participant pointed to the need for educating employees about OTs. "I think, educating the workforce, of course. They've got to be educated" (RSGS4). Another DARPA participant talked about how interactive OT training might help encourage wider use of OTs if the training was mandatory for senior organization employees.

Maybe a discussion, like not a training, but a one-hour discussion so everybody can figure it out, is a start . . . Make it an upper management mandatory; we want to get more OTs, this is why. Can everybody please brainstorm three; why you don't want it, why you do want it, why you want to stay the way you're running things? That way, we can

figure out what anxiety the folks . . . Have, and try to alleviate that, so they better understand [OTs] (RSGS3).

An SSL participant discussed how the time that the company invested in preparing for negotiating the RSGS OTs with DARPA helped them with their next OT. “We spent a lot of time preparing for working on the [RSGS OT] markup . . . And so, I think now we're much more familiar with it [OTs]. When I got the one that came out of Macdonald Dettwiler & Associates, U.S. Systems it was a lot easier to review” (RSGS5).

Significant findings for interview question 5b

Interview Question 5b is: What DoD-wide factors could be changed to impact use of OTs? Of the 5 case study participants interviewed:

- 2 of 5 (40%) participants discussed employee factors that could be changed to potentially impact DoD use of OTs.
- 3 of 5 (60%) participants discussed leadership and oversight factors that could be changed to potentially impact DoD use of OTs.
- 2 of 5 (40%) participants discussed training and communication factors that could be changed to potentially impact DoD use of OTs.

Appendix CC provides more information on the factors discussed by participants for this interview question. The significant findings for Interview Question 5b are:

DoD should consider the benefits to the commercial partner when negotiating OTs. DoD should be careful in using OTs lest Congress take away OT authority. DoD should guide contractors on what types of non-monetary contributions that contractors can provide to satisfy the cost-share requirements of OTs.

A majority of participants (3 of 5) discussed leadership and oversight factors that could be changed to impact DoD use of OTs. A DARPA participant, for example, explained how DoD has to consider the benefits to the commercial partner when negotiating OTs. “You hear a lot of talk about we [DoD] want to partner with commercial [industry]. That is a constant refrain coming from the highest levels of the Pentagon . . . What does not seem to sink into people is they have to think about the benefit to the commercial side of that arrangement. What do they get out of it, other than just government funds as usual kind of thing?” (RSGS2).

Another DARPA participant cautioned that DoD leadership should be careful in using OTs authority lest DoD lose OT authority by Congress taking it away. “We [DoD] could lose it [OT authority] has to be understood. It’s very important that leadership throughout the DoD understand how important it is for us to be able to reach out [to private industry] the way we can with an OT. We need all of these tools in the toolbox” (RSGS4).

An SSL participant asked whether DoD could instruct contractors about what types of non-monetary contributions could be provided to satisfy the OT cost share requirements. “I wonder if you guys [DoD] could also suggest ways that you could I guess make it clear that there's other ways that we can contribute [OT cost share]” (RSGS5).

Significant findings for interview question 5c

Interview Question 5c is: What factors do you believe are resistant to change, but if changed, would impact use of OTs? Of the 5 case study participants interviewed:

- 5 of 5 (100%) participants discussed employee factors that are resistant to change, but if changed, would potentially impact use of OTs.
- 1 of 5 (20%) participants discussed leadership and oversight factors that are resistant to change, but if changed, would potentially impact use of OTs.
- 2 of 5 (40%) participants discussed training and communication factors that are resistant to change, but if changed, would potentially impact use of OTs.

Appendix CC provides more information on the factors discussed by participants for this interview question. The significant findings for Interview Question 5c are:

DoD employees such as contracting officers are comfortable with procurement processes they understand, such as the FAR, and are uncomfortable to try new processes such as OTs. DoD employees will continue to be averse to using new procurement processes such as OTs unless they have employees around them that will help them become familiar with OTs. DoD employees don't understand where the line is between what can and cannot be negotiated in OTs.

All participants (5 of 5) discussed employee factors resistant to change, but if changed, would impact use of OTs. A DARPA participant discussed fear of where to draw the line in OT

negotiations; what is and is not permissible to negotiate. “I think it's that fear. It's just that simple fear of not understanding the when to use it and how to use it and where to draw the line. Where you have to stop negotiations because [some supervisors] will say everything's negotiable; but it's not really an absolute true statement” (RSGS1).

Another DARPA participant echoed this belief about fear of OTs. “I'm going to guess that the combination of the contracting officers and the counsels, the lawyers, of the various agencies are very nervous about these things [OTs]” (RSGS2). An added DARPA participant discussed fear of the unknown as a barrier to wider use of OTs across DoD. The participant explained how DoD employees becoming more familiar with OTs and understanding how easy they are to negotiate could ease this fear. “They could start using the OTs if they understand how to use them” (RSGS4).

Still another DARPA participant discussed how employee habits bias employees to shy away from trying things they are not comfortable with such as OTs. The participant discussed how this discomfort is perpetuated in work settings where employees do not have other employees that can help them become familiar with OTs. “People are conditioned . . . It's hard to change that, especially if people are very solid, and, this is what I know, and this is why I'm going to do it because this is what I know, and I don't want to experience something new because I don't understand it well and it takes me out of my comfort zone . . . It's the people around you don't know enough. You don't have enough support to be able to help you through it” (RSGS3).

This factor was also reflected in remarks by an SSL participant, who discussed employee thinking, how contracting officers are biased to think about the FAR. “I really think it's the thinking. Yeah, the contracting officers and their ability to think things beyond the norm. Yes, think beyond the FAR” (RSGS5).

Living Foundries OT Case Study

The second case study focused on ongoing OTs awarded to two nontraditional contractors under the DARPA Living Foundries program.

Organizational settings

The Living Foundries OTs discussed below are managed as part of the technical program portfolio of DARPA's Biological Technology Office (BTO).

BTO is DARPA's technology arm focused on leveraging advances in engineering and information sciences to drive and reshape biotechnology for technological advantage. BTO is responsible for all neuro-technology, human-machine interface, human performance, infectious disease, and synthetic biology programs within the Agency. BTO is bringing together leading-edge technologists, researchers, start-ups, and industry to solve problems that matter and drive technological revolution (DARPA BTO, 2018).

The Living Foundries program includes two OTs that are being performed by nontraditional contractors. The nontraditional contractors are Amyris, Inc. (Amyris) and Zymergen, Inc. (Zymergen). Amyris was founded in 2003, incorporated in 2010, and is headquartered in the San Francisco Bay Area in Emeryville, California. Amyris is applying its industrial synthetic biology platform to engineer, manufacture, and sell products into a range of consumer and industrial markets, including cosmetics, flavors and fragrances, solvents and cleaners, polymers, lubricants, healthcare products, and fuels (Reuters, 2018).

Zymergen was incorporated in 2013 and is also based in Emeryville, California. According to its company profile, Zymergen produces molecules for biomedical coatings and

adhesives that can be used as surgical glues by first responders, such as firemen, paramedics, flight crews, and others, either inside the body or on the skin to close a wound, or to protect against infection (Bloomberg, 2018b).

Living Foundries program overview

The Living Foundries program is part of the DARPA's portfolio of research programs in synthetic biology, a nascent but growing field in the biotechnology sciences (DARPA Living Foundries, 2018). The Living Foundries program started in July 2013 and is scheduled to continue through fiscal year 2020. Total funding for the program is about \$100 million. The program has been modified several times and, as discussed below, work is now being performed in task area 2 by Amyris and Zymergen under separate OTs.

Synthetic biology uses advanced science and engineering to make or redesign living organisms such as bacteria or cells so they can carry out specific functions. Synthetic biology often involves making new DNA, or genetic code, that doesn't naturally exist in nature (Pellerin, 2014). In fiscal year 2015, DARPA invested about \$300 million in biological projects, or about 10% of the Agency's overall budget (Verano, 2015).

DARPA's interest in synthetic biology arises from its potential application to biological manufacturing processes (Amyris OT, 2015a, p. 3). Biological manufacturing is in its infancy, and the work required to reduce the time, effort, and cost needed to develop a new microbe is risky. It is also at odds with the work needed to bring a product to market which is the chief goal of any company seeking to capitalize on the technology (Amyris OT, 2015a, p. 3). To overcome these challenges, the Living Foundries program aims to build a scalable, integrated, rapid design

of prototyping infrastructure, engineering biological tools, and systems necessary for advanced technology projects (DARPA-BAA-13-37, 2014).

DARPA intends for the Living Foundries program to realize unfeasible projects to develop advanced chemicals, materials sensing capabilities, and therapeutics for commercial and national defense needs (DARPA-BAA-13-37, 2014). The goal of the OTs investigated in this case study is to develop and establish the foundational technological infrastructure for engineering biology to provide new materials capabilities to manufacturing paradigms for DoD and the nation (DARPA-BAA-13-37, 2014). The program is driven by the need for large-scale design and rapid prototyping of biological building blocks based on common integrated platform technologies and capabilities that span the entirety of the biological design/build/test/learn cycle (DARPA-BAA-13-37, 2014). Thus, DARPA is seeking to create a first of its kind infrastructure defined as tools and processes that make possible scale and sophistication of experimentation, and interdisciplinary collaboration does not exist today.

From a national defense perspective, the Living Foundries program is motivated by the current reality that molecules for defense and commercial applications are very time-consuming and expensive to domestically manufacture in useful quantities (DARPA Living Foundries, 2018). Indeed, some types of molecules are currently impossible to make using existing synthetic approaches. DoD critically needs innovations and chemicals materials and therapeutics to advance defense capabilities. But technology advances are presently constrained by the limited set of available chemical building blocks and their associated chemistry.

Biologically produced molecules offer orders of magnitude higher diversity and chemical functionality compared to traditional approaches, thereby potentially enabling unexpected and currently unavailable materials with novel and superior product properties (DARPA Living

Foundries, 2018). The rapid design of prototyping infrastructure that will be created under the Living Foundries program should enable rapid exploration and development of this diverse chemical space. The Living Foundries program attempts to design tools and manufacturing processes that will enable the nation to achieve adaptable, scalable and on-demand production of militarily and commercially valuable molecules (Living Foundries, 2018).

Thus, the Living Foundries program attempts to transform bio manufacturing of such molecules into an established engineering practice that can further national defense mission needs. By funding the development of new biological manufacturing technologies, DARPA is seeking to create a first-of-its-kind infrastructure comprising tools and processes to help innovation across several applications and helping push biotechnology forward (Keller, 2013). Living Foundries program is attempting to develop a prototype of the building blocks for future biological engineering systems. Therefore, with the Living Foundries program, DARPA is attempting to set up a new biotechnology manufacturing industry.

Relevant to this case study, a significant goal of the Living Foundries program is to produce molecules and precursors across a range of applications that are potentially useful for defense mission needs. Each of the two OT contractors—Amyris and Zymergen—is required to generate at least 155 unique molecules. The contractors are also expected to show rapid, improved prototyping of known molecules, of known but now inaccessible molecules, and prototyping of novel molecules.

Another major program goal is to ensure U.S. leadership in the evolving field of synthetic biology (DARPA Living Foundries, 2018). Many of these molecules are relevant to the DoD mission due to their unique chemical properties that enable their use as fuels, lubricants, anti-

fouling agents, antibiotics, and adhesives while also providing building blocks for novel families of molecules (Amyris OT, 2015a, p. 3).

The Living Foundries program has two major phases, denoted as task areas. The first task area (task area 1) is Advanced Tools and Capabilities for Generalizable Platforms (ATCG). Task area 1 lasted for six months and was completed by the time the study started. ATCG focused on designing and automation tools, modular genetic parts and devices, standardized test platforms and chassis tools for the rapid physical construction of biological systems, editing and manipulation of genetic designs, and new characterization and debugging tools for synthetic biological networks (DAPRA Living Foundries, 2018). Since this task area was completed when the study started, the case study does not focus on task area 1.

The second task area (task area 2) of the Living Foundries program is called 1000 Molecules and was ongoing during the case study. Work under task area 2 started in 2017 and may last up to five years. Thus, 1000 Molecules, task area 2 of the Living Foundries program, is the focal point of the case study. 1000 Molecules builds on the results of ATCG by significantly decreasing the cost, improving the scalability, and expanding the complexity of engineered systems for bio-manufacturing (Foundries, 2018). The 1000 Molecules effort focuses on using automation, novel genome editing tools, and machine learning technologies to alleviate the challenges of prototyping novel molecules. The following Table summarizes the Living Foundries program phases and molecules deliverables for task area 2.

Table 28. Living Foundries Program Phases and Molecules Deliverables for Task Area 2

Program Phase for Task Area 2	Timeline	Molecule Deliverables
Phase I	Up to 20 months after OT award date	Demonstrate production of up to 10 target molecules; Identification of Phase II molecules
Phase II	Up to 18 months after Phase I	Demonstrate production of at least 60 target molecules; Identification of Phase III molecules
Phase III	Up to 24 months after Phase II	Demonstrate Production of at least 200 target molecules, including at least 10 novel target molecules
Program end	Up to 6 months after Phase III	Demonstrate production of at least 350 distinct molecules, including at least 10 novel target molecules

Source: DARPA-BAA-13-37 (Amendment No. 09).

On November 1, 2015, DARPA and Amyris entered into an OT for task area 2 work. The term of the OT is 48 months. The total value of the OT is about \$52 million. The OT discusses the expected benefits of the biological manufacturing technologies that Amyris will develop under the OT, including that:

Besides producing molecules relevant to the DoD, the commercial opportunities are immense since any molecule made through traditional manufacturing processes can be replicated using biology as a catalyst. Although engineering cellular factories have been intermittently successful, the cost and time required for success have been prohibitive. The Performer's new technological approach will develop new molecules and materials while improving efficacy and efficiency. Because of these improvements, the United States will reduce production time to under three years and at less than \$10 million per molecule while simultaneously handling 100 molecules, a 20x improvement (Amyris OT, 2015a, p. 3).

On August 23, 2015, DARPA and Zymergen entered into an OT for task area 2 work.

The term of the OT, with options, is until July 22, 2020. The total value of the OT is about \$19 million. The OT discusses the expected benefits of biological manufacturing technologies that Zymergen will develop under the OT, including that:

Zymergen will develop a unique capability, the Factory. The Factory will include integrated end-to-end workflows, and have adaptability and accessibility with technologists, metabolic engineers, and materials scientists across the United States. The Factory will provide a unique infrastructure facility to support the development of a diversity of military and commercial applications. The world-class capabilities developed in the Factory offer a service-based model for infrastructure sustainability, and the flexibility and breadth of potential production targets provide commercialization potential by a large variety of industrial partners. Zymergen's effort will lay the foundation for substantial improvements in engineering microbes, and for the development of a unique and powerful national capability (Zymergen OT, 2015b, p. 4).

The case study participants discuss these two OTs. Most of the participants' remarks reflect their recent experiences working on the Living Foundries program under these OTs.

Summary of the Living Foundries Major Findings

Like for the organization interviews in Chapter 4 and the RSGS case study discussed previously, there are numerous major findings for the Living Foundries participant interviews,

with several corresponding to each interview question. Appendix E provides the interview questions. The major findings also correspond to the five conceptual framework categories. The major findings are derived from significant findings for the corresponding subsidiary interview questions. Appendix E also provides the subsidiary interview questions.

Thus, the first major findings are for Interview Question 1 and are based on the significant findings for each of the three subsidiary interview questions subsumed under Interview Question 1. The discussion below therefore summarizes the major findings according to the related interview question and the significant findings according to related subsidiary interview questions. The researcher uses the significant findings to derive the major findings. The following Table summarizes the major findings for the Living Foundries interviews corresponding to the relevant conceptual framework category and interview questions.

Table 29. Summary of the Living Foundries Case Study Major Findings

Conceptual Framework Category	Interview Questions	Major Findings
1. OT Award	1: 1a 1b 1c	OTs enable the government to work more effectively with nontraditional contractors. OTs enable enhanced communications and information sharing during OT negotiations. The amount of prior experience that a contractor has with OTs can impact whether OT negotiations succeed.
2. OT Advantages versus Traditional Procurement Agreements (TPAs)	2: 2a 2b 2c	OTs offer simpler and more flexible terms and conditions than traditional procurement agreements. OTs impact the ability of organizations to attract and work with advanced technology contractors. OTs enhance the ability of organizations to achieve technical program goals. The Defense Contracts Management Agency (DCMA)—the DoD organization that administers awarded contracts, and increasingly, awarded OTs—is unfamiliar with OTs,

		and this may impede the more extensive use of OTs across DoD.
3. OT Disadvantages versus TPAs	3: 3a 3b 3c	OTs can take longer to negotiate than traditional procurement agreements because most terms and conditions are negotiable. OTs are flexible and thus can be changed during performing the OT, which is time-consuming for the parties. OT training should be required as part of a contracting officer's warrant. Only trained contracting officers should be authorized to negotiate and administer OTs.
4. Numbers of OTs versus TPAs	4: 4a 4b-c	The nature of the DoD organization's mission impacts the numbers of OTs executed compared to traditional procurement agreements. DoD organizations are used to relying on procurement regulations to help them to negotiate and administer traditional procurement agreements. DoD organizations lack confidence in their contracting officers to negotiate OTs because contracting officers have insufficient training and experience with OTs. Contracting officer workload can impact whether an OT or traditional procurement agreement is selected for a prospective procurement.
5. What can be Changed	5: 5a 5b 5c	Adopting OT best practices from other federal agencies such as the Department of Homeland Security (DHS) might positively impact DoD use of OTs. Publicizing OT success stories by organizations other than DARPA and DIUx may positively impact DoD use of OTs. Providing nontraditional contractors with basic OT training information—for instance, information comparing OTs to traditional procurement agreements—may positively impact DoD use of OTs. Providing more resources to DoD contracting agents might help them be more willing to use OTs.

Source: Author.

The following discussion reports the significant findings for the interview subsidiary questions in a narrative format, using extensive verbatim quotations from the participants' responses to interview questions to convey their perspectives and opinions. The researcher used

what he learned from these participant perspectives and opinions to derive the major findings for each of the interview questions.

Major findings for interview question 1

Interview Question 1 is: What do participants believe are institutional and other factors that influence the decision to use an OT instead of a traditional procurement agreement?

Interview Question 1 includes three subsidiary interview questions:

- a) How does your organization determine to select an OT instead of a traditional procurement agreement such as a contract, grant or cooperative agreement?
- b) If you select an OT, what factors can influence negotiations to succeed?
- c) If you select an OT, what factors can influence OT negotiations to fail?

The significant findings for Interview Questions 1a-c are:

- a) OTs enable the government to work with nontraditional contractors. OTs offer more negotiation flexibility and less administrative burdens than traditional procurement agreements, and these are important factors for small, nontraditional contractors.
- b) Contractors must give the government information it requests to help successful OT negotiations. The government must tell the contractor what OT terms and conditions are non-negotiable because of statutory or regulatory requirements. Skill at negotiating flexible payable technical milestones impacts whether OT negotiations are successful.

- c) Negotiating specific terms and conditions such as cost-share, property disposition, and intellectual property liability can contribute to OT negotiations failure. Whether the OT contractor has prior experience with OTs can add to OT negotiations failure. Negotiation of payment for OT technical milestones can be a potential source of OT negotiations failure.

The significant findings for Interview Questions 1a-c lead to the following major findings for Interview Question 1:

OTs enable the government to work more effectively with nontraditional contractors. OTs enable enhanced communications and information sharing during OT negotiations. The amount of prior experience that a contractor has with OTs can impact whether OT negotiations succeed.

The following discussion summarizes significant findings for Interview Questions 1a-1c.

Significant findings for interview question 1a

Interview Question 1a is: How does your organization determine to select an OT instead of a traditional procurement agreement such as a contract, grant or cooperative agreement? Of the 5 case study participants interviewed:

- 4 of 5 (80%) participants discussed administrative factors potentially impacting whether to select an OT instead of a traditional procurement agreement.

- 1 of 5 (20%) participants discussed contractor factors potentially impacting whether their organization selects an OT instead of a traditional procurement agreement.
- 0 of 5 (0%) participants DoD-wide factors potentially impacting whether to select an OT instead of a traditional procurement agreement.
- 3 of 5 (60%) participants discussed legal and policy factors potentially impacting whether to select an OT instead of a traditional procurement agreement.
- 1 of 5 (20%) participants discussed organization factors potentially impacting whether to select an OT instead of a traditional procurement agreement.

Appendix CC provides more information on the factors discussed by case study participants for this interview question. The significant findings for Interview Question 1a are:

OTs enable the government to work with nontraditional contractors. OTs offer more negotiation flexibility and less administrative burdens than traditional procurement agreements, and these are important factors for small, nontraditional contractors.

The large majority of participants (4 of 5) discussed administrative factors potentially affecting whether their organization selects an OT instead of a traditional procurement agreement. For example, a DARPA participant emphasized that OTs offer programs the ability to work with nontraditional contractors. “So, the OTs that I’ve been involved with . . . Has always been to work with industry. In our case, nontraditional performers in a way that we can move very quickly and with alacrity. And to have the ability to negotiate on each and every point with them” (LF3).

A participant from Zymergen discussed the lower overhead costs that OTs offer compared to traditional procurement agreements. The participant recollected the process used to select Zymergen's OT.

My memory of this is that . . . We kind of had the OTA option versus doing our full FAR-based contract. And there was a lot more sort of overhead burden associated with the FAR contract, making sure we're ready in case there's an audit, for things like tracking time and costs . . . The OTA . . . Seemed to be significantly lower and . . . That was really a big driver for us (LF5).

From a nontraditional contractor perspective, inexperience with government contracting may be a factor in selecting an OT instead of a traditional procurement agreement. For example, the Zymergen participant discussed the need for flexibility in negotiations since the OT was the first government agreement he had negotiated. "This is the first government contract I had ever been involved in negotiating" (LF5).

A participant from Ameryis also saw flexibility as a factor impacting the selection of an OT instead of a traditional procurement agreement. "You know, the other aspect is most of these are our new projects that we've signed up with. Having some flexibility around the work plan that goes into the agreement. I've added to mine, whether it's best to do an OT or a traditional agreement" (LF4). The Ameryis participant also commented on the relative inexperience his company has with government contracting. "When we started negotiations with DARPA, so we've had two contracts with DARPA so far. Both of them have been OTs" (LF4). The Ameryis participant discussed how the need to divide intellectual property rights between the parties weighed in favor of using an OT instead of traditional procurement agreement. "As a company, we generate IP as part of this program. Of course, that IP needs to be available to DARPA. It also needs to be available to us for our business interests" (LF4).

Significant findings for interview question 1b

Interview Question 1b is: If you select an OT, what factors can influence negotiations to succeed? Of the 5 case study participants interviewed:

- 3 of 5 (60%) participants discussed contractor factors potentially influencing OT negotiations to succeed.
- 2 of 5 (40%) participants discussed joint organization and contractor factors potentially influencing OT negotiations to succeed.
- 1 of 5 (20%) participants discussed legal and policy factors potentially influencing OT negotiations to succeed.
- 2 of 5 (40%) participants discussed organization factors potentially influencing OT negotiations to succeed.

Appendix CC provides more information on the factors discussed by case study participants for this interview question. The significant findings for Interview Question 1b are:

Contractors must give the government information it requests to help successful OT negotiations. The government must tell the contractor what OT terms and conditions are non-negotiable because of statutory or regulatory requirements. Skill at negotiating flexible payable technical milestones impacts whether OT negotiations are successful.

The majority of participants (3 of 5) discussed contractor factors potentially influencing OT negotiations to succeed. A DARPA support contractor, for instance, stressed the need for receiving adequate information from the OT contractor to enable negotiations to succeed. If the OT contractor is unwilling or slow to give adequate information, it can impede successful OT negotiations. The contractor illustrated this in the context of an ongoing program. “There's one company . . . It is just a battle every time to get information and get any sort of details . . . As opposed to another company which . . . Gives us all the information we want, and more . . . If we have enough information to actually make good decisions, then we're more likely to make good decisions and make them faster as well” (LF1).

A participant from Zymergen discussed how the size of the OT influenced them to accept more risk during negotiations. “For us . . . There's sort of a risk versus a reward, again as I think about it from a small stance of company standpoint . . . The size of the contract is something that makes us more willing to take risks, in this case” (LF5). The Zymergen participant also discussed that the government should provide contractors with a color-coded copy of the draft OT that indicates what terms and conditions are non-negotiable and this would enhance the potential for successful OT negotiations. “Just imagine color-coding the contract [OTA], where the terms that come in red, well, your hands are tied, that would be useful. You can point them to the statute that locks it down. But it allows you to say, let's move forward” (LF5).

A participant from Ameryis discussed how the ability to tailor payment for achieving technical milestones was a key factor for successful OT negotiations. He contrasted how skillfully negotiated technical milestones can accommodate differing amounts of technical progress during the OT: “Let's say there are four tasks within a [OT] milestone. Of those, two of them are successful, and two of them are deemed technically not feasible. With OTs, for me, it

was flexible because we got paid for, let's say, two out of the four tasks, so 50% payment. The other 50%, yeah, it was deemed unfeasible” (LF4).

Significant findings for interview question 1c

Interview Question 1c is: If you select an OT, what factors can influence negotiations to fail? Of the 5 case study participants interviewed:

- 2 of 5 (40%) participants discussed contractor factors potentially influencing OT negotiations to fail.
- 2 of 5 (40%) participants discussed joint organization and contractor factors potentially impacting OT negotiations to fail.
- 2 of 5 (40%) participants discussed legal and policy factors potentially influencing OT negotiations to fail.
- 0 of 5 (0%) participants discussed organization factors potentially influencing OT negotiations to fail.

Appendix CC provides more information on the factors discussed by case study participants for this interview question. The significant findings for Interview Question 1c are:

Negotiating specific terms and conditions such as cost-share, property disposition, and intellectual property liability can contribute to OT negotiations failure. Whether the OT

contractor has prior experience with OTs might add to OT negotiations failure. Negotiation of payment for OT technical milestones can be a potential source of OT negotiations failure.

Some participants (2 of 5) discussed legal and policy factors potentially influencing OT negotiations to fail. Some participants (2 of 5) also discussed contractor factors potentially affecting OT negotiations to fail. Some participants (2 of 5) further discussed joint organization and contractor factors potentially impacting OT negotiations to fail. From a legal and policy factors perspective, a participant from Amyris discussed the company's wish for protection from patent infringement liability while performing the OT work. In a traditional procurement agreement, this protection is implemented by a standard FAR clause known as the authorization and consent clause.

One of the [internal Amyris] discussions that we had that we finally had was, you know, there was a certain piece of technology that we would like to apply to our preferred program. Some of these technologies might be patented by [others] . . . Our IP lawyers are like, well, you have to be very careful . . . You won't get that authorization and consent . . . I think in the end that's . . . Fine, we decided to do it at our own risk . . . There are some companies that may not be willing to take that risk, and that could be a deal breaker for those companies (LF4).

A DARPA participant discussed how other terms and conditions in the OT such as the disposition of a prototype technology developed under the OT could be failure points for OT negotiations. "The tough negotiations that I've had in the past have been related to we're going to build this prototype in the end. Turns out the performer wants to keep it. How do you do that? . . . You've got to get creative in terms of how they either buy that back or provide the government some type of service in return" (LF2).

From the contractor perspective, a participant from Zymergen discussed how the contractor's OT cost-share can be a source of confusion to the contractor, and thus a potential failure point in OT negotiations. "The idea of the cost share was, it was something that was a little bit confusing . . . We were very concerned about the number, the price of the overall [OT] contract, as opposed to the piece of that price that the government was going to pay. And that difference between those is a cost share. But when we first negotiated it, it's not something we realized" (LF5).

A DARPA participant discussed the need to limit the frequency of OT changes, noting that although an OT is a "living document," there is a limit on the number of times that the contractor should request to modify the OT (LF1). Contrasting his experience negotiating OT modifications with contract modifications, the participant concluded that "Frequency [of OT changes] makes it break down because I think everybody loses tolerance for the process and feels like the other people aren't being smart about how they approach the [OT] contract" (LF1). From the viewpoint of joint organization-contractor factors, a DARPA participant contrasted how working with experienced versus inexperienced contractors can influence OT negotiations to fail. "If you work with a rather well experienced organization . . . They've done this before, so they know what works for a contract. But . . . With small entities that maybe have three or four people as part of their organization, and this might be the first time they're going into contract negotiations . . . That becomes very challenging" (LF3).

Another DARPA participant discussed the challenges of negotiating how and when the OT contractor should be paid for achieving technical milestones. "One of the other areas that often we negotiate that can sometimes be difficult is the amount of funding we will allow them [the OT contractor] to earn per milestone. Getting a sense through negotiations of what their

projected expenditure profile is why they may need that type of funding helps us close those negotiations” (LF2). The participant explained how negotiating OT technical milestones can lead to negotiations failure where the contractor demands sizeable up-front funding.

Are they going to be procuring a lot of hardware up front in the development of the prototype? Is there some termination liability that they're focused on? From the program manager perspective, we want to have a payment that is commensurate with the technical accomplishment, so not giving them \$2 million for their monthly technical report. That's not worth it. When you have built the prototype and test it, that is a significant technical milestone that really deserves significant amount of funding. It's often times a sticking point that we negotiate (LF2).

Major findings for interview question 2

Interview Question 2 is: What do participants believe are the advantages of OTs compared to traditional procurement agreements? Interview Question 2 includes three subsidiary interview questions:

- a) What are the advantages of using OTs compared to traditional procurement agreements such as contracts, grants, and cooperative agreements?
- b) How do the advantages of OTs impact use of OTs in your organization?
- c) How do the advantages of OTs impact use of OTs in other DoD organizations?

The significant findings for Interview Questions 2a-c are:

- a) OTs offer simpler and more flexible terms and conditions than traditional procurement agreements. OTs are less bureaucratic than traditional procurement agreement. The absence

of bureaucracy enhances the ability of the parties to OT draft terms and conditions to describe novel technologies.

- b) OTs impact the ability of organizations to attract and work with advanced technology contractors. OTs enhance the ability of organizations to achieve technical program goals.
- c) Recent senior DoD leadership focus on OTs has had positive impacts on awareness and use of OTs across DoD. DCMA—the DoD organization that administers awarded contracts, and increasingly, awarded OTs—is unfamiliar with OTs, and this may impede the wider use of OTs across DoD.

The significant findings for Interview Questions 2a-c lead to the following major findings for Interview Question 2:

OTs offer simpler and more flexible terms and conditions than traditional procurement agreements. OTs impact the ability of organizations to attract and work with advanced technology contractors. OTs enhance the ability of organizations to achieve technical program goals. DCMA—the DoD organization that administers awarded contracts, and increasingly, awarded OTs—is unfamiliar with OTs, and this may impede the more extensive use of OTs across DoD.

The following discussion summarizes significant findings for Interview Questions 2a-c.

Significant findings for interview question 2a

Interview Question 2a is: What are the advantages of using OTs compared to traditional procurement agreements such as contracts, grants, and cooperative agreements? Of the 5 case study participants interviewed:

- 4 of 5 (80%) participants discussed flexibility advantages of OTs compared to traditional procurement agreements.
- 2 of 5 (40%) participants discussed speed and efficiency advantages of OTs compared to traditional procurement agreements.
- 3 of 5 (60%) participants discussed organization advantages of OTs compared to traditional procurement agreements.
- 1 of 5 (20%) participants discussed contractor advantages of OTs compared to traditional procurement agreements.

Appendix CC provides more information on the factors discussed by case study participants for this interview question. The significant findings for Interview Question 2a are:

OTs offer simpler and more flexible terms and conditions than traditional procurement agreements. OTs are less bureaucratic than traditional procurement agreements. The lack of bureaucracy enhances the ability of the parties to OT draft terms and conditions to describe novel technologies.

The large majority of participants (4 of 5) discussed flexibility OT advantages of OTs compared to traditional procurement agreements. A DARPA participant pointed directly at this advantage by stating that, “I’m sure everybody has said they [OTs] are flexible” (LF2). Another DARPA participant discussed the inherent flexibility that the non-standard format of OTs offers for crafting flexible terms and conditions for describing new technologies. “The non-standard format, that’s actually a benefit too. So, often times we’re working with new prototypes that have never been described before. And the ability to describe them in the most appropriate way for that [OT] contract, is a huge advantage” (LF3).

A Zymergen participant reflected on flexibility as an advantage of OTs: “There’s flexibility . . . Which is good for a small company. Without knowing the ins and outs of all of the FAR, it just seems like there’s a bit more simplicity and flexibility in the OT” (LF5).

A participant from Ameryis contrasted his company’s experience with OTs compared to its experience with federal grants.

It [an Amyris federal grant] was way too bureaucratic, but you know, it’s a Department of Energy (DOE) grant, and we have technologies that would need DOE funds. I know that you had to go through a lot more hoops that you go through with a DOE grant than you do with the DARPA-funded OT (LF4).

Significant findings for interview question 2b

Interview Question 2b is: How do the advantages of OTs impact use of OTs in your organization? Of the 5 case study participants interviewed:

- 3 of 5 (60%) participants discussed organization impacts on the participant’s organization.

- 3 of 5 (60%) participants discussed collaborative organization-contractor impacts on the participant's organization.
- 1 of 5 (20%) participants discussed speed and efficiency impacts on the participant's organization.
- 2 of 5 (40%) participants discussed contractor impacts on the participant's organization.

Appendix CC provides more information on the factors discussed by case study participants for this interview question. The significant findings for Interview Question 2b are:

OTs positively impact the ability of organizations to attract and work with advanced technology contractors. OTs enhance the ability of organizations to achieve technical program goals.

A majority of participants (3 of 5) discussed organization impacts on the participant's organization. A majority of participants (3 of 5) also discussed collaborative organization-contractor effects on the participant's organization. About organization impacts, several participants discussed how OTs enhance their organization's abilities to attract and work with advanced technology contractors. A DARPA participant discussed how experience with OTs in the Living Foundries program is positively impacting her desire to use OTs for future programs. "I'm considering OTs for my next program, just because I know they are attractive to industry . . . And it's hard to get industry excited about DoD money sometimes. Especially in biology. So, any incentive that we can provide to get excited about, it is something that is helpful to me to pursue" (LF3).

Another DARPA participant discussed a new effort to use OTs to work with universities—which are atypical OT contractors. “I’ve never awarded an OT for a prototype to a university. . . . They’re so used to receiving grants and cooperative agreements, that is the majority of what we award . . . And now I’m saying . . . You’re getting an OT for a prototype” (LF2). The same participant also discussed how an OT template would help him work with universities on their OTs.

One of the things we’re trying to do is to address that is we’re going to put a model, a draft OT with the solicitation saying, look, these are the terms and conditions that we intend on offering and as part of that proposal package they have to send that back to me an edited version of the OT. Tell me what you would like to change in this agreement so that we can address these issues immediately if there are any issues. This is going to be an experiment . . . I’ve never seen a university accept an OT (LF2).

Several other participants discussed the positive impacts that OTs have on helping achieve technical program goals. For example, a DARPA participant addressed the need to match the OT to program goals. “It really comes down to when does it [OT] match up with what you’re trying to accomplish. For example, with some of the other programs . . . Where I awarded OTs, and where we specifically knew going into negotiations we were doing OTs” (LF2). The same participant discussed how an OT could be drafted to enable the technical program to achieve specific technical milestones and objectives, here about a DARPA space program. The participant explained how the contracting officer and program manager could work together and leverage OTs to achieve technical program goals.

He [the DARPA program manager] knew exactly what he wanted. He had a very tight schedule and a set budget and said he wanted firm-fixed-price . . . He had technical accomplishments that he knew he wanted those performers for both programs to hit to get paid and to keep them very focused on . . . OTs . . . Allowed us the flexibility to buy

another air vehicle if we needed to even though it wasn't initially in the scope . . . It's really for the contracting officer to sit down with the PM and have a discussion. What do you want out of this program? What's really important to you? (LF2).

Several participants also discussed administrative impacts of OTs on the participant's organization. For example, a DARPA participant explained how OTs are positively viewed as part of his organization's culture. "The culture of DARPA and our leadership which embraces OTs . . . They are looked upon fondly . . . The culture of the place really drives the acceptance and use of the [OT] award instrument, and they are accepted here" (LF2). Conversely, another DARPA participant discussed the higher administrative workload of tracking technical progress on OTs compared to traditional procurement agreements: "Every time one of these [OT] milestones come through, I write an evaluation. I make recommendations. It's a lot of sifting through these contracts to see how one piece of the puzzle impacts all the other pieces. It is more work . . . From a program manager standpoint" (LF1).

Concerning collaborative organization-contractor impacts, a Zymergen participant discussed how DARPA and Zymergen's goals for the OT have to be complementary. "It's one of the things I like especially (sic) DARPA . . . DARPA doesn't want to fund something we're going to do anyway. So, it has to be something that's in line with our corporate goals" (LF5). A DARPA participant discussed collaboration between DARPA and OT contractors on executing modifications to an OT. "There's cost to modification too; to the performer, to the government, to everybody. It costs a lot of money to put those [OT modifications] through, so you want to minimize that. It's kind of a threshold between the large duration and large cost" (LF1).

Significant findings for interview question 2c

Interview Question 2c is: How do the advantages of OTs impact use of OTs in other DoD organizations? Of the 5 case study participants interviewed:

- 0 of 5 (0%) participants discussed flexibility impacts of OTs on other DoD organizations.
- 1 of 5 (20%) participants discussed speed and efficiency impacts of OTs on other DoD organizations.
- 2 of 5 (40%) participants discussed DoD-wide impacts of OTs on other DoD organizations.
- 0 of 5 (0%) participants discussed contractor impacts of OTs on other DoD organizations.

Appendix CC provides more information on the factors discussed by case study participants for this interview question. The significant findings for Interview Question 2c are:

Recent senior DoD leadership focus on OTs has had positive impacts on awareness and use of OTs across DoD. DCMA—the DoD organization that administers awarded contracts, and increasingly, awarded OTs—is unfamiliar with OTs, and this may impede the more extensive use of OTs across DoD.

Some participants (2 of 5) discussed DoD-wide impacts of OTs on other DoD organizations. A DARPA participant, for example, discussed recent DoD senior leadership focus on OTs. “It’s [OTs] the hot thing . . . Everybody’s talking about it . . . Last October or November, Kendall [the former USD(AT&L)], right before he left sent out an email to the entirety of DoD talking about

how great OTs are” (LF2). The same participant discussed recent attention to OTs at procurement conferences: “It is hot. It was a big topic at the recent National Contract Management Association (NCMA) conference” (LF2). The participant also discussed how DCMA is unfamiliar with OTs, implying this unfamiliarity can negatively impact the use of OTs across DoD.

We rely on . . . DCMA to help us administer our [OT] awards. DCMA is not versed in OTs. They do not understand them. I remember last year we got . . . Contract efficiency reports . . . Issued by DCMA, which is when they look at a contract, and they don't find a particular clause there . . . A DCMA Administrative Contracting Officer (ACO) who called me up and said this was the worst contract they'd ever seen written, didn't have any FAR clauses or DFARS clauses . . . I said it's because it's an OT, so there are no FAR. She was like, what's an OT? . . . They [DCMA] had their own learning curve. They had not administered one before . . . I'm not the only CO who has had problems getting [DCMA] ACOs to administer the [OT] awards . . . I think DCMA is slowly coming around . . . They're having to administer more and more of them [OTs] (LF2).

Major findings for interview question 3

Interview Question 3 is: What do participants believe are the disadvantages of OTs compared to traditional procurement agreements? Interview Question 3 includes three subsidiary interview questions:

- a) What are the disadvantages of using OTs compared to traditional procurement agreements such as contracts, grants, and cooperative agreements?
- b) How do the disadvantages of OTs impact use of OTs in your organization?
- c) How do the disadvantages of OTs impact use of OTs in other DoD organizations?

The significant findings for Interview Questions 3a-c are:

- a) OTs can take longer to negotiate than traditional procurement agreements because most terms and conditions are negotiable. OTs can be changed repetitively during OT administration, which is time-consuming for the parties. Technical milestones may be a challenge for the contractor to achieve, resulting in lower or delayed milestone payments from the government. OT contractors believe it is difficult for the government to add funds to an ongoing OT to pay for new work or to defray unanticipated work costs.
- b) DoD organizations such as DARPA are trying to reduce the time to negotiate and award OTs. OT contractors believe OTs take the same time to negotiate as commercial contracts. OT contractors want the government to pay for unanticipated or unplanned work during OT administration.
- c) OT training should be required as part of a contracting officer's warrant. Only trained contracting officers should be authorized to negotiate and administer OTs. Cultural change is needed by DoD to access and leverage advanced technologies from nontraditional contractors.

The significant findings for interview questions 3a-c lead to the following major findings for Interview Question 3:

OTs can take longer to negotiate than traditional procurement agreements because most terms and conditions are negotiable. OTs are flexible and thus can be changed during performance of the OT, which is time-consuming for the parties. OT training should be required as part of a

contracting officer's warrant. Only trained contracting officers should be authorized to negotiate and administer OTs.

The following discussion summarizes significant findings for Interview Questions 3a-c.

Significant findings for interview question 3a

Interview Question 3a is: What are the disadvantages of using OTs compared to traditional procurement agreements such as contracts, grants, and cooperative agreements? Of the 5 case study participants interviewed:

- 1 of 5 (20%) participants discussed experience disadvantages of OTs compared to traditional procurement agreements.
- 5 of 5 (100%) participants discussed OT negotiation and administration disadvantages of OTs compared to traditional procurement agreements.
- 0 of 5 (0%) participants discussed culture disadvantages of OTs compared traditional procurement agreements.

Appendix CC provides more information on the factors discussed by case study participants for this interview question. The significant findings for Interview Question 3a are:

OTs can take longer to negotiate than traditional procurement agreements because most terms and conditions are negotiable. OTs are flexible and thus can be modified repetitively during

performance of the OT, which is time-consuming for the parties. Technical milestones may be challenging for contractors to achieve, resulting in lower or delayed milestone payments from the government. OT contractors believe it is difficult for the government to add funds to an ongoing OT to pay for new work or for defraying unanticipated work costs.

All participants (5 of 5) discussed OT negotiation and administration disadvantages of OTs compared to traditional procurement agreements. Several participants discussed OT negotiation disadvantages of OTs. For example, a DARPA participant discussed the higher workload associated with needing to negotiate every part of an OT. “Historically, and one of the disadvantages in general about using OTs, is just that you end up negotiating sometimes, depending on the proposer, every single sentence . . . It literally gets down to single words and single commas” (LF2).

Another DARPA participant juxtaposed the flexibility advantages of OTs with the extra time needed to negotiate them because of difficulties in getting contractors to give the government necessary documentation. “Often what takes the longest time for us for awarding these [OT] contracts . . . Is we get a proposal in, it never has the documentation you requested in the BAA. Our first step is to go back to them and say where is your subcontractor proposal? Where's your documentation to support your labor rates? Where is your documentation to support all of your materials costs and equipment costs?” (LF2).

Still another DARPA participant discussed how the specter of missing an OT technical milestone might deter contractors from wanting to enter an OT with the government. “I think it scares performers . . . If you're going to spend all this time and pay your lawyers to write up a contract, and spend all the time getting the scientists assembled, and you spin up this whole

operation just to miss an [OT] milestone” (LF1). The same participant elaborated on the technical specificity of OT milestones as a potential disadvantage of OTs from the contractor’s perspective. “I think it would likely scare them [the OT contractor] before they got into negotiations and realize when you negotiate milestones, there are levels of exactness. You [the government] can say I need 15 widgets by Thursday” (LF1). The participant concluded that if the contractor fails to achieve OT technical milestones, this can impact contractor revenue. The participant contrasted this with venture capital funding, which he believes comes with fewer performance strings attached. “A, B, C [venture capital] investors, they have some money, and it's tied down, but I can guarantee they don't have a team of [DARPA] biochemists grilling through their data to make sure every little bit is being accounted for . . . So, I feel like there are less strings attached to that [venture capital funding], and because of that, if you [the OT contractor] have that option, that may be a better option to go to” (LF1).

Several other participants discussed OT administration disadvantages of OTs. A DARPA participant, for instance, mentioned how time-consuming that an OT can be to administer. “It's very time consuming for proper care and feeding. But I don't mean that in [an] entirely negative way. I'm grateful that we can do that. That we can alter those statements at work” (LF3). The same participant also pointed to the administrative burden created because almost everything in an OT is negotiable, yet is needed so that the agreement can be changed to keep pace with rapidly evolving technology fields. “For me, there have been two things during the course of the [Living Foundries OT] effort that have been a challenge. And that is because everything is negotiable. These continuously come up if that the pace of this field—in my case, in biology and metabolic engineering—is moving so quickly that we always try to look ahead” (LF3). The participant also discussed how lack of insight into the contractor's cost proposals can be a

potential disadvantage of OTs. “One of the challenges has also been, for me personally is, we don't have a lot of insight into the [contractor's] cost breakdown for any given task. And so, sometimes I may find it hard to believe that somebody could execute a task for such a low dollar amount” (LF3).

An Amyris participant discussed the challenges related to adding more government funds to an ongoing OT to pay for new work. “I know this applies to traditional procurement also, but adding additional funds; let's say I'm going, we're doing this proposal, and then we realize, hmm, you know what? We should really be working on this additional technology. Just needing to find additional funding to an OT [for the additional work], that's challenging” (LF4). A Zymergen participant also discussed challenges associated with getting more government funding added to OTs, and that addressing this challenge would encourage his company to do more OTs with the government.

We're not pursuing another one [OT] right now. But I think . . . The only thing that would pull me towards a FAR-based contract would be if it made sense to have a sort of cost-plus type situation. In some of our [Living Foundries task area 2] tests, we've spent five, six, seven times the amount of money that, achieving the test than we expected to . . . So . . . It would be nice if we could say . . . Can you [government] pick up the tab (LF5)?

Significant findings for interview question 3b

Interview Question 3b is: How do the disadvantages of OTs impact use of OTs in your organization? Of the 5 case study participants interviewed:

- 0 of 5 (0%) participants discussed organization experience of OT disadvantages.

- 3 of 5 (60%) participants discussed organization negotiation and administration impacts of OT disadvantages.
- 2 of 5 (40%) participants discussed organization culture impacts of OT disadvantages.

Appendix CC provides more information on the factors discussed by case study participants for this interview question. The significant findings for Interview Question 3b are:

DoD organizations such as DARPA are trying to reduce the amount of time it takes to negotiate and award OTs. OT contractors believe that OTs take the same amount of time to negotiate as commercial contracts. OT contractors would like a way to have the government pay the costs for unanticipated or unplanned work during OT administration.

The majority of participants (3 of 5) discussed organization administration impacts of OTs. For example, a DARPA participant discussed his organization's ongoing initiative to reduce the time to negotiate and award OTs, including to review and negotiate OT costs. "How do we shrink this DARPA process from idea generation to award to 90 days? . . . We put out a special notice to the program announcement . . . We give proposers 30 days . . . What I'm trying to do by requiring OTs only is shorten our (internal) process so that we can hopefully finish our analysis of their proposed costs without having to go back to a performer to request additional information" (LF2).

From the OT contractor's perspective, a participant from Amyris noted that there are no negotiation time savings of OTs compared to commercial contracts. "I've been through both this

kind of OT (sic) with DARPA, and I've also been with commercial agreements with the sponsors, with our other commercial sponsor. It seems like they both take the same time” (LF4).

A participant from Zymergen suggested that adding a cost-plus feature to OTs would help offset unanticipated or unplanned contractor costs during performance of the OT. “So, cost-plus is attractive, or you need flexibility to maybe add cost-plus, maybe line items to an OT . . . That would be nice . . . You're guessing, as to what your costs are, and then sometimes you guess wrong or sometimes you, oops, leave something out” (LF5).

Significant findings for interview question 3c

Interview Question 3c is: How do the disadvantages of OTs impact use of OTs in other DoD organizations? Of the 5 case study participants interviewed:

- 1 of 5 (20%) participants discussed DoD experience impacts of OT disadvantages.
- 1 of 5 (20%) participants discussed DoD negotiation and administration impacts of OT disadvantages.
- 2 of 5 (40%) participants discussed DoD culture impacts of OT disadvantages.

Appendix CC provides more information on the factors discussed by case study participants for this interview question. The significant findings for Interview Question 3c are:

OT training should be required as part of a contracting officer's warrant. Only trained contracting officers should be allowed to negotiate and administer OTs. Cultural change is needed by DoD to access and leverage advanced technologies from nontraditional contractors.

Some participants (2 of 5) discussed DoD culture impacts of OT disadvantages. For instance, a DARPA participant discussed how at other DoD organizations, the program manager has multiple duties beyond program management. "Some of my colleagues in other departments are the equivalent of the technical seat at the [technical requirement organization] and the program manager. They're all wrapped into one" (LF3).

Another DARPA participant cited DoD culture as impacting the use of OTs at organizations other than DARPA: "I really believe its culture and leadership" (LF2). The participant elaborated on some DoD cultural impediments to wider use of OTs. He suggested that OT training should be a formal part of a contracting officer's warrant requirements. "Maybe what they [Air Force and Army] need to do is set up some type of training program and, just like we do here, it becomes part of your [contracting officer] warrant" (LF2). The same participant also discussed that DoD cultural change is needed if DoD is to use OTs to access and leverage advanced technologies available from nontraditional contractors.

It's a culture shift. It's going to be driven by what they are also trying to do, I think . . . It's not necessarily the big ten traditional defense contractors who are coming up with the best ideas. It's a lot of these smaller companies, and how do we work with them? . . . [OTs] have been one way we have found to be successful in attracting them to work with us (LF2).

Major findings for interview question 4

Interview Question 4 is: What do participants believe explains DoD's numbers of OTs compared to traditional procurement agreements? Interview Question 4 includes three subsidiary interview questions:

- a) What factors in your organization help explain the number of OTs executed compared to traditional procurement agreements such as contracts, grants, and cooperative agreements?
- b) What DoD-wide factors help explain the numbers of OTs compared to traditional procurement agreements?
- c) What other factors help explain the numbers of OTs compared to traditional procurement agreements?

As discussed in Chapter 4, during the participant interviews, some participant responses to subsidiary Interview Questions 4b and 4c were redundant. So, the researcher combines the participant responses to subsidiary Interview Questions 4b and 4c. The significant findings of subsidiary Interview Questions 4b and 4c are combined, and both are discussed below under subsidiary Interview Question 4b.

- a) The nature of the DoD organization's mission impacts the numbers of OTs executed compared to traditional procurement agreements. Heavy contracting officer workload can influence whether an OT or traditional procurement agreement is selected for a project. Projects involving universities may favor using a grant instead of an OT. For nontraditional

contractors, the company's business objectives impact whether it prefers using an OT or a traditional procurement agreement.

- b) DoD organizations lack confidence in their contracting officers to negotiate OTs because their contracting officers have insufficient training and experience with OTs. DoD organizations are used to relying on procurement regulations to help them negotiate and administer traditional procurement agreements. Heavy workload for contracting officers results in more traditional procurement agreements being awarded than OTs.

The significant findings for interview questions 4a-b/c lead to the following major findings for Interview Question 4:

The nature of the DoD organization's mission impacts the numbers of OTs executed compared to traditional procurement agreements. DoD organizations are used to relying on procurement regulations to help them to negotiate and administer traditional procurement agreements. DoD organizations lack confidence in their contracting officers to negotiate OTs because contracting officers have insufficient training and experience with OTs. Contracting officer workload can impact whether an OT or traditional procurement agreement is selected for a prospective procurement.

The following discussion summarizes significant findings for interview questions 4a-b/c.

Significant findings for interview question 4a

Interview Question 4a is: What factors in your organization help explain the number of OTs executed compared to traditional procurement agreements such as contracts, grants, and cooperative agreements? Of the 5 case study participants interviewed:

- 2 of 5 (40%) participants discussed organization experience factors potentially explaining the numbers of OTs compared to traditional procurement agreements.
- 3 of 5 (60%) participants discussed OT negotiation and administration factors potentially explaining the numbers of OTs compared to traditional procurement agreements.
- 5 of 5 (100%) participants discussed organization culture factors potentially explaining the numbers of OTs compared to traditional procurement agreements.

Appendix CC provides more information on the factors discussed by participants for this interview question. The significant findings for Interview Question 4a are:

The nature of the DoD organization's mission impacts the numbers of OTs executed compared to traditional procurement agreements. Heavy contracting officer workload can influence whether an OT or traditional procurement agreement is selected for a project. Projects involving universities may favor using a grant instead of an OT. For nontraditional contractors, the company's business objectives impact whether it prefers using an OT or a traditional procurement agreement.

All participants (5 of 5) discussed organization culture factors explaining the numbers of OTs compared to traditional procurement agreements. For instance, a DARPA participant discussed that the organization's mission, and being open to awarding OTs ,are critical cultural factors that help explain the relative numbers of OTs compared to traditional procurement agreements.

I think it has to do with either the agency itself is not open to awarding them . . . If the agency isn't open to doing it [OTs] and it's not a tool in their toolbox, they're not doing it. I think that's the case for most agencies. I just think in general . . . If the mission of the agency doesn't lend itself to working with nontraditionals . . . If you're really not a research-driven organization, and you just are buying . . . Missiles . . . If that is the agency's mission, there's no reason they should not be doing it (LF2).

Another DARPA participant discussed how the workload of DARPA's contracting agents impacts the numbers of OTs that DARPA awards compared to traditional procurement agreements. "I worked with many different contracting agents . . . And when there's a new [DARPA] program coming, one of the first questions they ask me is . . . Are we going to have OTs? . . . I think people are interested in doing it [OTs], but on the flip side . . . They're trying to gauge their bandwidth versus my need" (LF3).

Still another DARPA participant discussed how the type of contractor impacts the relative numbers of OTs compared to traditional procurement agreements. According to the participant, university labs do the most advanced research work and universities favor using traditional procurement agreement such as grants:

If you want to look for cutting edge, you look for academic; you don't look at companies. Companies already bought the cutting edge, and they're developing it . . . But the people that do the heavy lifting, to kind of start that wave, is the people in academic labs . . . If that's the case and it's an academic is appropriate for grant-based opportunities, then that

seems very logical . . . If you're cutting edge . . . You're probably not doing as many OTAs (LF1).

The same participant added that he believed that DARPA's Contracts Management Office (CMO) might make the final decision to use an OT or a traditional procurement agreement. "I know that a PM could tell CMO, no, I want an OTA instead of a grant. I don't know if that flies. Maybe CMO has the last word. Like, maybe PMs think that's how it is; maybe it's not as far as DARPA protocol" (LF1).

From the nontraditional contractor perspective, an Amyris participant discussed the company's contract portfolio and how the DARPA program (Living Foundries) fits in with them. "We have . . . Two government-funded programs, which is the DARPA one and the DOE one, and a previous DARPA program that got over, but then now we have anywhere from eight to ten private contracts going on at the same time . . . The DARPA-funded program actually is a great fit for us . . . Which no private company's going to pay us for" (LF4).

A Zymergen participant discussed how it has only done two government agreements; one OT (Living Foundries) and one grant. The participant explained that for Zymergen, the relative numbers of government agreements and commercial contracts is driven by company business objectives. "It's alignment with our business objectives . . . We specifically are working with industrial fermentation companies, and so that's kind of where that focus is going to be . . . And so, in our case, the OTA work was a way to get the funding to sort of jumpstart this other business that happens to be very in line with the goals of the project" (LF5).

Significant findings for interview questions 4b-c

Interview Question 4b is: What DoD-wide factors help explain the numbers of OTs compared to traditional procurement agreements? Of the 5 case study participants interviewed:

- 0 of 5 (0%) participants discussed DoD experience factors potentially explaining the numbers of OTs compared to traditional procurement agreements.
- 0 of 5 (0%) participants discussed OT negotiation and administration factors potentially explaining the numbers of OTs compared to traditional procurement agreements.
- 3 of 5 (60%) participants discussed DoD culture factors potentially explaining the numbers of OTs compared to traditional procurement agreements.

Appendix CC provides more information on the factors discussed by participants for this interview question. The significant findings for Interview Question 4b-c are:

DoD organizations lack confidence in their contracting officers to negotiate OTs because contracting officers have insufficient training and experience with OTs. DoD organizations are used to relying on procurement regulations to help them negotiate and administer traditional procurement agreements. The heavy workload on contracting officers results in more traditional procurement agreements being awarded than OTs.

Some participants (3 of 5) discussed organization culture factors potentially explaining the numbers of OTs compared to traditional procurement agreements. For example, a DARPA

participant assessed the state of the DoD procurement system by noting that “You know, when I think of traditional procurement, I think of it as this kind of broken thing” (LF1). Several other DARPA participants focused on more specific DoD-wide cultural factors that might explain the relative numbers of OTs and traditional procurement agreements. For instance, one DARPA participant discussed that the Military Departments do not allow their contracting officers to use OTs because these employees are perceived as lacking the business and regulatory experience to negotiate OTs. “I think that just in general is part of the reason why a lot of the [military] services aren't and haven't permitted their COs to do OTs is you have to be a sound business advisor, you have to have a good grasp of regs (regulations) to allow your CO to negotiate that and not give away the farm or not do something ridiculous” (LF2).

The same participant recalled his prior work experience with the Navy, and how the Navy's reliance on procurement regulations may have caused the Navy not to have sufficient confidence in their contracting officers to allow them to negotiate OTs.

Part of the problem . . . The Navy, they have their process . . . You got the FAR, the DFARS, then they [the Navy] have their Navy Marine Corps Acquisition Regulation Supplement (NMCARS) . . . It's difficult, I think, for a lot of the major Services to break out of that mold and think creatively. I also think because of the autonomy given to the Contracting Officer (CO), and because of the requirement for the CO to really understand acquisition regulations and, again, the limits on that flexibility, it requires a lot of faith in your contracting staff, and that you could feel uncomfortable having them negotiate basically a blank-slate agreement [OT] (LF2).

The participant discussed how large DoD contracting offices do not understand OTs because they lack OT training. This causes less confidence to select an OT, resulting in fewer OTs than traditional procurement agreements being awarded by these offices. “I don't think there's been enough very good training and education about them. I've helped train some

organizations . . . On the use of OTs, and you can see that they're not there yet. They don't really understand them” (LF2).

Another participant discussed that contracting officer workload impacts deciding to select a traditional procurement agreement rather than an OT. “I think that's the way the contracting officers are thinking about it . . . I know they have to parse up workload . . . So, they do have to parse out their workload, and I'm imagining that's a problem for DARPA. That's got to be a huge problem for big DoD as well” (LF3).

Major findings for interview question 5

Interview Question 5 is: What do participants believe are factors that could be changed to impact DoD use of OTs? Interview Question 5 includes three subsidiary interview questions:

- a) What factors in your organization could be changed to impact use of OTs?
- b) What DoD-wide factors could be changed to impact use of OTs?
- c) What factors do you believe are resistant to change, but if changed, would impact use of OTs?

The significant findings for Interview Questions 5a-c are:

- a) Adopting OT best practices from other federal agencies such as DHS might positively impact DoD organization use of OTs. DoD being more flexible on reimbursing OT contractors' costs might positively impact contractors' willingness to use OTs.

- b) More OT training may positively impact the DoD-wide use of OTs. Publicizing OT success stories by organizations other than DARPA and DIUx may positively impact the DoD-wide use of OTs. Providing nontraditional contractors with basic training OT training information, for instance, information comparing OTs to traditional procurement agreements, may positively impact the DoD-wide use of OTs.
- c) Employee discomfort with OTs can lead to adding more FAR and DFARS clauses to OTs to protect the government's interests: This "FAR-creep" can impact the use of OTs. Providing more resources to DoD contracting agents will help them be more favorable to negotiating OTs. Supplying OT training and success metrics to contractors may positively impact the use of OTs.

The significant findings for interview questions 5a-c lead to the following major findings for Interview Question 5:

Adopting OT best practices from other federal agencies such as DHS might positively impact DoD use of OTs. Publicizing OT success stories by organizations other than DARPA and DIUx may positively impact DoD use of OTs. Providing nontraditional contractors with basic OT training information, for instance, information comparing OTs to traditional procurement agreements, may positively impact DoD use of OTs. Providing more resources to DoD contracting agents might help them be more willing to use OTs.

The following discussion summarizes significant findings for interview questions 5a-c.

Significant findings for interview question 5a

Interview Question 5a is: What factors in your organization could be changed to impact use of OTs? Of the 5 case study participants interviewed:

- 1 of 5 (20%) participants discussed employee factors that could be changed to potentially impact organization use of OTs.
- 3 of 5 (60%) participants discussed leadership and oversight factors that could be changed to potentially impact organization use of OTs.
- 2 of 5 (40%) participants discussed training and communication factors that could be changed to potentially impact organization use of OTs.

Appendix CC provides more information on the factors discussed by participants for this interview question. The significant findings for Interview Question 5a are:

Adopting OT best practices from other federal agencies such as DHS might positively impact DoD organization use of OTs. If DoD was more flexible on reimbursing OT contractors' costs, it might positively impact contractors' willingness to use OTs.

A majority of participants (3 of 5) discussed leadership and oversight factors that could be changed to impact organization use of OTs. A DARPA participant, for example, discussed several ideas for increasing use of OTs, though not by DARPA. One idea is to use more consortium OTs. "I think if we embraced a consortium approach, ultimately more OTs will be

awarded" (LF2). The same participant also reflected about how to reduce the award timeline by using the OT evaluation processes from the DHS Silicon Valley Innovation Program (SVIP).

How do we shrink the [OT] timeline from idea to award? . . . For example, this DHS SVIP approach is unique, because they actually have proposers come in and do essentially a live pitch, and the decision is pretty much made on the spot which is very unique . . . Everybody keeps calling it the Shark Tank approach, where they come in, and they get the thumbs up, thumbs down, and then they get funded. If we implement something unique like that it would lead to potentially more use of OTs (LF2).

A participant from Ameryis discussed that few barriers were preventing it from using OTs more. "I think really; we would just keep using the OTs when we apply for common grants. I don't think there's anything holding us back from using the OTs, just that how many government-funded programs we want . . . I mean, we have the legal team . . . With a DoD or a private contract, they approach it just the same every time" (LF4). A participant from Zymergen discussed how OTs with more flexibility on reimbursing contractor costs would help the company be more favorable to doing OTs: "I think that that sort of cost-share and cost-plus . . . Would make OTs more desirable" (LF5).

Significant findings for interview question 5b

Interview Question 5b is: What DoD-wide factors could be changed to impact use of OTs? Of the 5 case study participants interviewed:

- 1 of 5 (20%) participants discussed employee factors that could be changed to potentially impact DoD use of OTs.

- 2 of 5 (40%) participants discussed leadership and oversight factors that could be changed to potentially impact DoD use of OTs.
- 3 of 5 (60%) participants discussed training and communication factors that could be changed to potentially impact DoD use of OTs.

Appendix CC provides more information on the factors discussed by participants for this interview question. The significant findings for Interview Question 5b are:

More OT training may positively impact DoD-wide use of OTs. Publicizing OT success stories by organizations other than DARPA and DIUx may positively impact the DoD-wide use of OTs. Providing nontraditional contractors with basic training OT training information, for instance, information comparing OTs to traditional procurement agreements, may positively impact the DoD-wide use of OTs.

A majority of participants (3 of 5) discussed training and communication factors that could be changed to impact DoD use of OTs. For example, a DARPA participant linked the willingness of DoD organizations to use OTs to training. “If there's this belief out there that OTs can in some ways speed that up, more agencies may embrace it. But they may find out it's a little bit more challenging than that. It is culture. It is education. Obviously, training falls under education” (LF2). Another DARPA participant was more conservative, discussing the need for more OT success stories and expressing concern that the long award timelines sometimes associated with OTs might disrupt procurement processes at other DoD organizations.

I think the [OT] success stories, I've only heard it talked a lot about in the context of DARPA and DIUx, and those are two very special organizations. If it's [OTs] to be used more broadly, I think it would have tremendous impact . . . But these very long [OT] contract timelines, this could really disrupt procurement . . . I don't know what the appetite for this is (LF3).

A participant from Zymergen discussed how providing basic OT training materials to contractors might make nontraditional contractors more willing to use OTs. “Imagine there being, kind of a cheat sheet . . . Or a small white paper showing the difference between an OT and a FAR [contract] . . . Maybe, pluses and minuses . . . The differences between OT and FAR [contract] and why one might pick one versus the other . . . Getting that kind of help about what the difference is and why we might want to choose one versus the other could be helpful” (LF5).

Significant findings for interview question 5c

Interview Question 5c is: What factors do you believe are resistant to change, but if changed, would impact use of OTs? Of the 5 case study participants interviewed:

- 2 of 5 (40%) participants discussed employee factors that are resistant to change, but if changed, would potentially impact use of OTs.
- 1 of 5 (20%) participants discussed leadership and oversight factors that are resistant to change, but if changed, would potentially impact use of OTs.
- 2 of 5 (40%) participants discussed training and communication factors that are resistant to change, but if changed, would potentially impact use of OTs.

Appendix CC provides more information on the factors discussed by participants for this interview question. The significant findings for Interview Question 5c are:

Employee discomfort with OTs can lead to adding FAR and DFARS clauses to OTs to protect the government's interests: This “FAR-creep” can impact the use of OTs. Providing more resources to DoD contracting agents will help them be more favorable to negotiating OTs. Supplying OT training and success metrics to contractors may positively impact the use of OTs.

Some participants (2 of 5) discussed employee factors that are resistant to change, but if changed, might impact the use of OTs. A DARPA participant, for example, discussed how his discomfort with the flexibility of OTs can lead him to add more FAR-based terms and conditions to an OT during negotiations. The participant discussed this issue by contrasting traditional procurement agreements and an OT that he negotiated where the OT lacked certain mandatory clauses incorporated in traditional procurement agreements.

Part of my problem that I have found is . . . Just because of my own comfort level, you start to add terms [to an OT], overly add terms and conditions . . . Two major defense contractors who were . . . Going to build the same prototype. One, I awarded a FAR-based procurement contract . . . That had all the DFARS clauses in there . . . or the safeguarding information and cyber incident reporting. The OT with the other large defense contractor did not have the same requirements . . . I started adding it because I just felt uncomfortable (LF2).

A Zymergen participant discussed how working with successive DoD program managers can impact making modifications to an OT. “You could imagine some difficulty, just getting used to different people, their styles, and their interests” (LF5).

Some participants (2 of 5) also discussed training and communication factors that are resistant to change, but if changed, might impact the use of OTs. For example, a DARPA participant discussed that contracting agents should be provided more resources because of the higher negotiation workload typically associated with OTs compared to traditional procurement agreements. “There is a greater workload associated with these [OT] contracts. But to ensure that there are the resources to support those activities, I think would be helpful” (LF3).

Another DARPA participant discussed how contractors might be resistant to using OTs because of the lack of OT education. “I don't know if it is education, but I don't know how you educate the community at large to say, look, these aren't terrible contracts” (LF1). The same participant wondered if there are OT metrics that contractors could review to decide what DoD organizations are good to work with on OTs. “Are there metrics for who [in DoD] executes OTA's well, right? There's no DARPA gets an A+, and whoever else gets a C, and you don't want to do an OTA with them. There are no metrics for measuring how easy that process is going to be” (LF1).

Chapter 6–Interpretation and Synthesis of the Major Findings

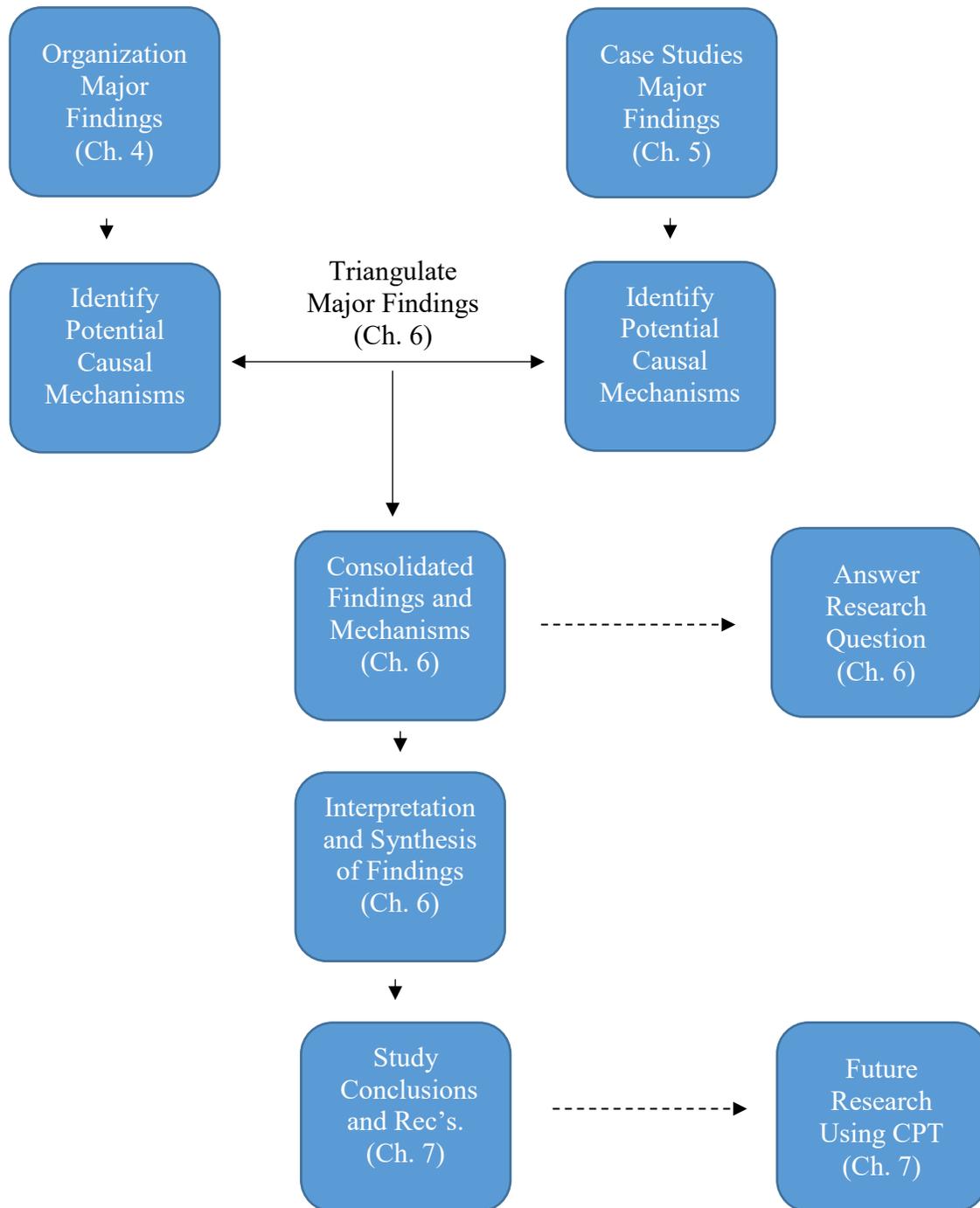
Introduction

This chapter interprets and synthesizes the major findings from Chapter 4 and Chapter 5. As discussed below, the major findings of the OT cases studies are used to triangulate the major findings of the organization interviews. Triangulation leads to consolidated major findings and potential causal mechanisms derived from these findings. The consolidated major findings are used to provide a narrative answer the research question, which is: Why, despite their reported administrative advantages, are OTs only sparingly used by DoD compared to more administratively burdensome traditional procurement agreements?

During interpretation and synthesis, the researcher tried to gain useful insights related to the research hypothesis, which is: Although Congress has amended the OT statute to encourage wider use OTs, DoD has continued to use OTs sparingly. Based on the researcher's professional experience, institutional resistance to using OTs can be traced to path dependence and positive feedback mechanisms such as low leadership support and employee risk aversion and habit. The numbers and variety of OTs at some DoD organizations, however, indicate that institutional change is occurring, and this may lead to a critical juncture or policy tipping point, resulting in wider use of OTs across DoD.

The following Figure illustrates how the discussion sections in this chapter and Chapter 7 relate to the major findings from Chapter 4 and Chapter 5. The Figure is meant to serve as a roadmap for the major discussions sections in this chapter and Chapter 7, linking their discussions to the prior chapters.

Figure 14. Flow of the Chapter 6 and 7 Discussion Sections in Relation to the Major Findings from Chapters 4 and 5



Source: Author.

Triangulation of the Major Findings of Chapter 4 Using the Major Findings of Chapter 5

The study uses the major findings from the OT case studies (Chapter 5) to triangulate the major findings from the organization interviews (Chapter 4). As discussed below, triangulation consists of identifying potential causal mechanisms corresponding to each of the major findings from Chapter 4 and Chapter 5 and then comparing these mechanisms to assess how well they matched. The greater the extent of matching (replication), the more the researcher considers triangulation to be successful. Triangulation helps improve the internal and external validity of the study findings and to answer the research question more reliably.

Chapter 3 discusses how the study's triangulation method is based on the prior literature. To recap, the researcher adopts the mechanistic comparative case methods of Beach (2016) and Yin (2009) for the OT case studies. The study adapts this literature to use the major findings from the OT case studies in Chapter 5 to triangulate the organization interview findings from Chapter 4. Thus, Chapter 5 data is used to corroborate the reliability of Chapter 4 data. The researcher expects that the major findings from the participant interviews—as represented by potential causal mechanisms derived from these findings—will be replicated in the corresponding potential causal mechanisms from the OT case studies. Since the researcher theorizes that the interview findings might answer the research question, the more that potential causal mechanisms for Chapter 4 are replicated by the potential causal mechanisms for Chapter 5, the more reliable inferences that can be made from the major findings from these chapters to answer the research question. The rationale for using potential causal mechanisms instead of the major findings for this triangulation process is discussed below.

The unit of analysis is an OT—here, the OTs investigated in the RSGS and Living Foundries case studies. The population is all ongoing DoD OTs. This is assumed to a

homogenous population in the sense that OTs, and the DoD organizations that award and administer them, are similar. For instance, all OTs are awarded and administered under the same law (10 U.S.C. § 2371b) and DoD regulations (32 C.F.R. Part 3). The DoD organizations are organized similarly and all contribute to the DoD mission institutionalized by the National Defense Strategy discussed in Chapter 1.

Triangulation process

Triangulation comprises the following steps. Initially, the researcher prepared a table summarizing the major findings for the organization interviews from Chapter 4 and the major findings from the RSGS OT case study and the Living Foundries case study from Chapter 5. Appendix FF provides a table showing a side-by-side summary of these major findings from Chapter 4 and Chapter 5. Second, using the summary table in Appendix FF, the researcher prepared potential causal mechanisms corresponding to each of the major findings. The researcher tried to use deductive logic and common sense to derive these potential causal mechanisms. The researcher uses the word “potential” because the study is exploratory and so does not investigate whether the causal mechanisms actually cause an outcome of research interest. That investigation is left to future research, which is discussed in Chapter 7 as part of the recommendations discussion.

There was one potential causal mechanism for each segregable part of a major finding. For example, as shown in Appendix BB, major finding 1 from Chapter 4 was, in part: Organizations select OTs instead of traditional procurement agreements because OTs help them field new advanced technology capabilities and to do business with non-traditional contractors.

Using deductive reasoning, the researcher determined that a potential causal mechanism corresponding to this major finding is: DoD seeks to do business with nontraditional contractors. Following this reasoning process, Appendix GG provides the potential causal mechanisms corresponding to each major finding from Chapters 4 and 5. As discussed below, there are 27 potential causal mechanisms for the organization major findings from Chapter 4 and 33 potential causal mechanisms for the case studies major findings from Chapter 5.

Next, the researcher compared the potential causal mechanisms from the organization interviews (Chapter 4) to the potential causal mechanisms from the OT case studies (Chapter 5). The purpose of comparison process is to figure whether the causal mechanisms for the organization interviews (Chapter 4) are replicated by the causal mechanisms for the OT case studies (Chapter 5). Appendix GG uses underlining and italicizing to show that about 80% of the potential causal mechanisms from Chapter 4 were replicated in Chapter 5.

There are three reasons the researcher derives and compared potential causal mechanisms instead of simply comparing the major findings. First, the prior literature teaches how causal mechanisms and comparative case studies can be used investigate research hypotheses in qualitative studies (Yin, 2009; Beach, 2016). The prior literature discusses that causal mechanisms can be hypothesized and then empirically evaluated using selected case studies. Research inferences about the causal mechanisms can be used to infer conclusions about a homogenous population of cases from which the case studies were selected. Because this causal mechanism replication method has found acceptance in public policy research, the researcher adapts it here for triangulation purposes. The OT case studies are selected because, in part, the researcher believes they represent the larger homogenous population of OTs and the DoD employees and contractors that support those OTs. Since the researcher assumes these OTs are

representative of the larger population of DoD OTs, the researcher's hunch is that causal mechanisms identified for the organization interviews should be replicated in the OT case studies. Thus, following this logic, the OT case studies are used to triangulate the findings of the organization interviews.

Second, the process of reducing the major findings to potential causal mechanisms helps the researcher organize and better understand the major findings. The researcher finds that the deductive reasoning process involved with identifying potential causal mechanisms for the major findings causes him to think hard about the meanings of the major findings. The potential causal mechanisms are shorter than the corresponding major findings and are written with active verbs. In this manner, the researcher finds the potential causal mechanisms to be useful heuristics for organizing the major findings. In addition, because they are shorter than the major findings, the potential causal mechanisms are easier to compare to each other than the major findings. Thus, the process of identifying potential causal mechanisms helps the researcher organize, understand, and analyze the major findings.

Third, the conclusions section of Chapter 7 discusses how CPT may be used to conduct future research of the DoD OT program. It provides an overview of the prior CPT literature, including how CPT may be used for qualitative research on path dependence and other concepts of historical institutionalism. Hypothesizing and then empirically investigating causal mechanisms is central to conducting CPT. The potential causal mechanisms identified in this study offer future researchers with a starting point for using CPT to conduct additional research on the DoD OT program. Thus, the researcher identifies potential causal mechanisms because they might be useful to future researchers. This is discussed in more detail in Chapter 7.

Getting back to the triangulation steps, as mentioned, Appendix GG provides the potential causal mechanisms that correspond to the major findings of the organization interviews (Chapter 4) and the OT case studies (Chapter 5). Appendix GG shows that 27 potential causal mechanisms are identified for the major findings from the organization interviews, 19 potential causal mechanisms are identified for the major findings from the RSGS OT case study; and that 14 potential causal mechanisms are identified for the major findings from the Living Foundries case study. Thus, there are 27 potential causal mechanisms for the organization interviews and a total of 33 potential causal mechanisms for the OT case studies.

For triangulation, the researcher compares the 27 potential causal mechanisms from the organization interviews with the 33 potential causal mechanisms from the OT case studies. The comparison results are revealing—only 6 six of 27 potential causal mechanisms (~22%) of the organization interviews are not replicated in the potential causal mechanisms for the RSGS and Living Foundries OT case studies. These potential causal mechanisms are underlined in Appendix GG. Looking at the causal mechanisms from the opposite direction—from the OT case studies to the organization interviews—only 4 of 19 potential causal mechanisms (~21%) from the RSGS OT case study are not replicated in potential causal mechanisms for the organization interviews. In addition, only 3 of 14 potential causal mechanisms (~21%) of the potential causal mechanisms from the Living Foundries OT case study are not replicated.

Thus, to assess the extent of replication, the comparison process is carried out in two directions: first, by comparing organization potential causal mechanisms to case studies potential causal mechanism and then second, in the opposite direction, by comparing case studies potential causal mechanisms to organization potential causal mechanisms. In Appendix GG, organization potential causal mechanisms (Chapter 4) that are not replicated by case studies potential causal

mechanisms (Chapter 5) are underlined. Similarly, in Appendix GG, case studies potential causal mechanisms (Chapter 5) that are not replicated by organization potential causal mechanisms (Chapter 4) are italicized. To illustrate this, the following Table is an extract from Appendix GG and is provided to show how this comparison process for the potential causal mechanisms, is carried out—here, for Interview Question 3 and conceptual framework category 3 (OT Disadvantages Versus TPAs).

Table 30. Potential Causal Mechanisms for the Major Findings of Interview Question 3

Organization Interviews: Potential Causal Mechanisms*	RSGS OT Case Study: Potential Causal Mechanisms**	Living Foundries OT Case Study: Potential Causal Mechanisms**
<ol style="list-style-type: none"> 1. DoD personnel resist change, including trying OTs 2. <u>Rigid DoD leadership punishes personnel if an OT fails</u> 3. DoD’s risk-intolerant culture discourages DoD personnel from using OTs 4. <u>The Army's failed FCS program deters some DoD organizations from using OTs</u> 	<ol style="list-style-type: none"> 1. <i>DoD personnel are uncertain about what OT terms are mandatory versus negotiable.</i> 2. DoD organizations lack OT expertise, causing protracted OT negotiation 3. <i>DoD program managers are discouraged from using OT by a lack of OT expertise</i> 4. DoD organizations are dependent on traditional procurement agreements 5. DoD organizations don't use OTs because of fear of the unknown 	<ol style="list-style-type: none"> 1. <i>OTs take longer to negotiate than traditional procurement agreements because most terms and conditions are negotiable</i> 2. <i>OTs changes during performance of the OT are time-consuming</i> 3. Only appropriately trained contracting officers should be authorized to negotiate and administer OTs

	6. DoD organizations resist if they are forced to use OTs	
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Source: Appendix GG.

* Underlined mechanisms = not replicated by the case studies potential causal mechanisms.

** Italicized mechanisms = not replicated by the organization interviews potential causal mechanisms.

The Table above shows two potential causal mechanisms from the organization interviews (mechanisms 2 and 4) are not replicated by the potential causal mechanisms for the OT case studies. These non-replicated causal mechanisms are underlined. The Table above also shows that four potential causal mechanisms from the OT case studies (mechanisms 1 and 3 for the RSGS OT case study and mechanisms 1 and 2 for the Living Foundries OT case study) that are not replicated by any of the potential causal mechanisms for the organization interviews. These non-replicated causal mechanisms are italicized. The rest of the mechanisms, namely those in plain text in the Table above, are replicated.

Triangulation results

Overall, Appendix GG shows that ~80% of potential causal mechanisms for the organization interviews are replicated in the OT case studies. Likewise, ~80% of potential causal mechanisms for the OT case studies are replicated in the organization interviews. Although these replication levels are lower than chi-square and significance levels (α) used for interpreting results in quantitative studies (e.g., $\alpha = 0.05, 0.1$, etc.), the researcher believes the

replication levels can be characterized as significant for qualitative research (McNabb, 2008, pp. 190-191).

While the researcher does not try to apply quantitative interpretation or hypothesis testing methods to the triangulation process—or to any other part of the study—he reflected on quantitative methods while evaluating the replication levels of the potential causal mechanisms. The high level of causal mechanism replication gives the researcher confidence that the major findings for the organization interviews are reliable. The researcher believes the ~80% replication level shows that the study has reasonable internal and external validity. So, the researcher concludes that the major findings for the OT case studies successfully triangulate the major findings for the organization interviews. In addition to improving the reliability of the study's major findings, this conclusion, as discussed in Chapter 3, also lends support to the researcher's decision to use only the most frequently coded interview segments during data analysis.

Consolidated Major Findings and Potential Causal Mechanisms

Based on the observed high replication levels for the potential causal mechanisms, and to extract as much meaning from the data as possible, the researcher decided to consolidate the major findings from the organization interviews, the OT cases studies, and their corresponding potential causal mechanisms. In other words, the researcher decided to prepare a set of major findings that represented consolidation of all the major findings from Chapter 4 and Chapter 5. This section summarizes the consolidation process.

Appendix HH provides the consolidated major findings and their corresponding consolidated potential causal mechanisms. Table 30 above shows that the organization interviews for Interview Question 3 resulted in two potential causal mechanisms that are not replicated in the OT case studies. These are:

- Rigid DoD leadership punishes personnel if an OT fails.
- The Army's failed FCS program deters some DoD organizations from using OTs.

Table 30 above also shows that the OT case studies for Interview Question 3 results in four potential causal mechanisms that are not replicated in the organization interviews. These are:

- DoD personnel are uncertain about what OT terms are mandatory versus negotiable.
- DoD program managers are discouraged from using OT by a lack of OT expertise.
- OTs take longer to negotiate than Traditional procurement agreements because most terms and conditions are negotiable.
- OTs changes during performance of the OT are time-consuming.

Relevant to these non-replicated mechanisms, Interview Question 3 is: What do participants believe are the disadvantages of OTs compared to traditional procurement agreements? The researcher determines that each of these non-replicated potential causal mechanisms and their corresponding major findings are nevertheless relevant to answering Interview Question 3. Thus, to help organize the major findings and the potential causal

mechanisms, the researcher combines all the potential mechanisms and major findings from Chapter 4 and Chapter 5 to derive consolidated findings and causal mechanisms. As an example of this derivation process, the following are the consolidated major findings and potential causal mechanisms for Interview Question 3. These represent the combined major findings and potential causal mechanisms from the organization interviews (Chapter 4) and the OT case studies (Chapter 5) for Interview Question 3.

Table 31. Consolidated Major Findings and Potential Causal Mechanisms for Interview Question 3

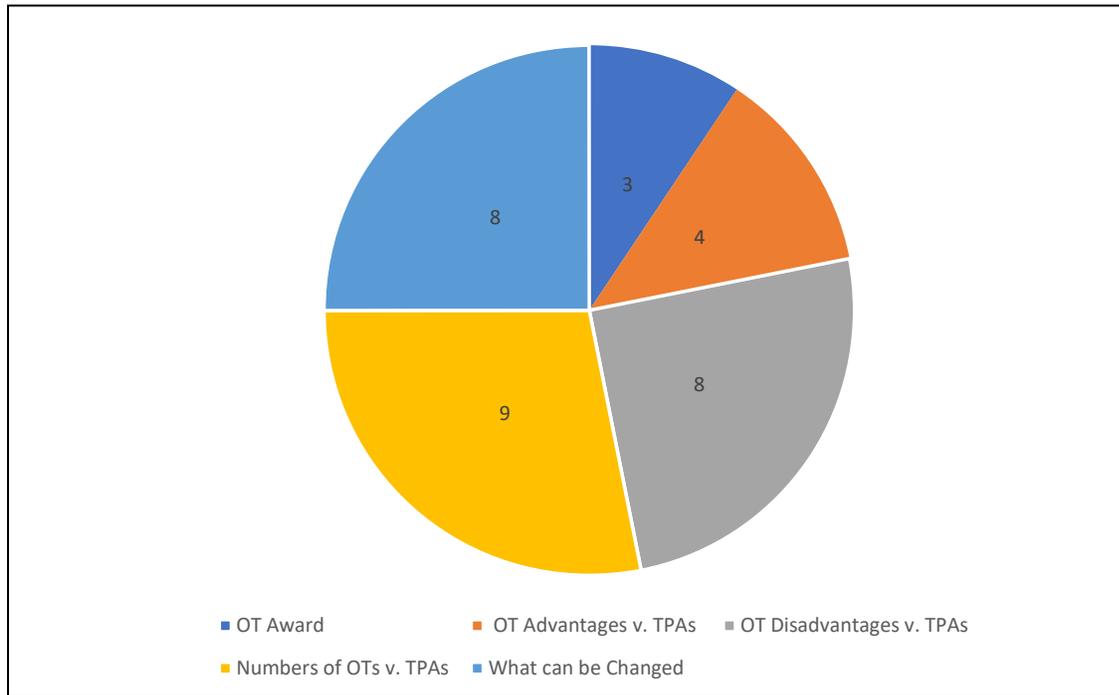
Consolidated Major Findings	Consolidated Potential Causal Mechanisms
<ul style="list-style-type: none"> i. Some employees resist change (OTs) because they fear losing control of procurement processes and turf ii. It is uncertain what OT terms and conditions are mandatory versus negotiable iii. OTs take longer to negotiate than traditional procurement agreements because most terms are negotiable iv. Changes during an OT are time-consuming v. Lack of OT expertise discourages employees from trying OTs vi. DoD's risk-intolerant culture discourages employees from using OTs and punishes OT failure vii. DCMA is unfamiliar with OTs, impeding the wider use of OTs viii. The Army's failed FCS program continues to impact the wider use of OTs by DoD 	<ul style="list-style-type: none"> • Employees resist change, including trying OTs • Employees are uncertain about what OT terms are mandatory versus negotiable • OTs take longer to negotiate than traditional procurement agreements • OT changes are time-consuming • Lack of OT expertise discourages employees from using OT • DoD's risk-intolerant culture discourages employees from using OTs • DCMA is unfamiliar with OTs • The Army's failed FCS program deters DoD organizations from using OTs

Source: Appendix HH.

As shown in the Table above, for Interview Question 3, the consolidated major findings and consolidated potential causal mechanisms are the result of combining the major findings from the organization interviews from Chapter 4 and the RSGS OT case study and the Living Foundries OT case study major findings from Chapter 5. The researcher deduced the depicted potential causal mechanisms corresponding to each of these consolidated major findings.

The researcher followed the same process to consolidate the major findings and potential causal mechanisms for each of the interview questions. The consolidated major findings represent the overall major findings for each of the study's interview questions. The potential causal mechanisms correspond to the consolidated major findings. Appendix HH provides the consolidated major findings and consolidated potential causal mechanisms for all interview questions. These data are organized by conceptual framework category. The following Figure illustrates the numbers of consolidated major findings by consolidated framework category.

Figure 15. Numbers of Consolidated Major Findings by Conceptual Framework Category



Source:

Appendix HH.

In the following discussion sections, these consolidated major findings and potential causal mechanisms are used to provide a narrative answer to the research question and to support the interpretation and synthesis discussions. The consolidated major findings and potential causal mechanisms are also used in the conclusions and recommendations sections in Chapter 7. Thus, the consolidated major findings and potential causal mechanisms provide a primary source of data supporting the discussions in the remaining sections of the dissertation.

An Answer to the Research Question

The consolidated major findings provided in Appendix HH provide an answer to the research question. A narrative version of Appendix HH is presented below to offer a more readable answer to the research question. But first, a caution is in order. The study uses a qualitative research design. As discussed in Chapter 1, because qualitative researchers apply their subjective interpretations to what they see and hear, qualitative research does not test hypotheses. Instead, qualitative research tries to understand critical concepts and meanings used in institutional settings to develop a holistic account of the study problem or issue.

With this caution in mind, the answer to the research question provided below is the result of qualitative research and reflects the researcher trying to improve his understanding of institutional factors that may impact why DoD has not more widely used OTs. The answer to the research question below is not the only answer to the research question, nor is it necessarily the correct answer. Instead, the answer to the research question is based on the researcher trying to develop a holistic account of the research problem using data collected during the study. So, with this caution in mind, and given the data collected and analyzed by the study, the following is a narrative answer to the research question, which is:

Why, despite their reported administrative advantages, are OTs only sparingly used by DoD compared to administratively more burdensome traditional procurement agreements?

In answer to the research question, study participants identified several factors that potentially contribute to the relatively sparing use of OTs within DoD. For example, study

participants believed DoD organizations select OTs instead of traditional procurement agreements to help field advanced technology capabilities and to work with nontraditional contractors. DoD organizations select OTs because they offer flexible terms and conditions, for instance, the government can accept funding from the contractor.

Whether OT negotiations succeed depends on the parties' prior experience with OTs, mutual trust, open communications, flexibility, and understanding each other's legal and business needs. Study participants noted several major advantages of OTs compared to traditional procurement agreements. OTs offer simpler and more flexible terms and conditions than traditional procurement agreements; for instance, changing an ongoing OT is easier, and the government can accept funding and in-kind contributions from the OT contractor. Fewer rules and regulations apply to OTs than traditional procurement agreements. Participants believed OTs improve communication and collaboration between the parties. OTs positively impact the ability of DoD organizations to attract advanced technology contractors, enabling new technology solutions for mission needs.

But participants also noted several major disadvantages of OTs compared to traditional procurement agreements. For example, participants discussed how employees resist change (OTs) because they fear losing control of procurement processes and turf. Participants were uncertain what OT terms and conditions are mandatory versus negotiable. Another disadvantage of OTs is that they can take longer to negotiate than traditional procurement agreements because most terms are negotiable. Participants discussed that it is a myth that OTs are quicker to award than traditional procurement agreements. Sometimes OTs take longer to award, particularly where the negotiation team is inexperienced with OTs. Changes during an ongoing OT are time-

consuming. The lack of OT expertise discourages employees from trying OTs. In addition, DoD's risk-intolerant culture deters employees from trying OTs and punishes OT failures.

Participants observed that DCMA is still unfamiliar with OTs, impeding the wider use of OTs. The Army's failed FCS program continues to impact the broader DoD use of OTs. DoD has a long institutional memory for failure and its memory of the FCS experience deters some DoD organizations from trying OTs. Concerning the relative numbers of OTs compared to traditional procurement agreements, participants thought that traditional procurement agreements are appropriate for most DoD requirements. But participant also believed potential OT advantages such as speed to award can impact the numbers of OTs.

Employee workload impacts the numbers of OTs—higher workload results in fewer OTs. Participants believed organizations with R&D missions have higher numbers of OTs. They also thought that DoD leadership insufficiently supports OTs. There is not enough training and policy guidance for OTs. Participants discussed that the increased resources and creativity needed to negotiate OTs cause more traditional procurement agreements. Employees are used to relying on familiar procurement regulations and policies. Thus, employees are risk-averse to try new procurement processes such as OTs.

Participants noted several major factors that could impact the use of OTs. They discussed that organizational inertia, and employee habit and risk aversion negatively impact use of OTs. Leadership must actively and publicly support OTs and encourage their wider use. Participants believed more OT policy guidance, OT templates, and knowledge management tools would help employees use OTs. Employees should be delegated more authority and independence to use OTs.

Employees should not suffer adverse career consequences just because an OT fails. Participants suggested that adopting OT best practices from other federal agencies would help DoD use OTs. Participants noted that providing training information to nontraditional contractors would make them more willing to use OTs. In addition, providing more resources to DoD contracting agents would make them more willing to negotiate and award OTs on behalf of other DoD organizations.

Interpretation and Synthesis of the Consolidated Major Findings

This section provides an overview of the interpretation and synthesis discussion below. For interpretation, the researcher uses the prior literature and direct quotations from the participant interviews. For synthesis, the researcher uses the concepts of historical institutionalism from the prior literature and his professional perspectives on the consolidated major findings.

According to Bloomberg (2012), the goal of interpretation and synthesis is to tell a story that considers the context the study, and connects the participants, processes, activities, and experiences to the research question. With this goal in mind, the purpose of interpreting the study data is to seek ways to understand what the study found by comparing the consolidated major findings within and across conceptual framework categories. Interpretation includes comparing the studies major findings with the prior literature topics discussed in Chapter 2. Synthesis considers the consolidated major findings using the concepts of historical institutionalism as theoretical foci and by applying the researcher's professional perspectives.

The study uses qualitative methods to collect interview data from 30 study participants and to conduct two OT case studies. As discussed in Chapter 3, the data are coded, analyzed, and organized by research question and conceptual framework category. The coding scheme includes predetermined codes and sub-codes based on the researcher's professional experience and the prior literature and emergent sub-codes based on review the initial organization interview transcripts.

Several cautions apply to the following interpretation and synthesis of the study data. First, the research sample for the study is relatively small—comprising interview data from 30 qualitative interviews and two OT case studies. Thus, this is small-n research. The study participants are selected, in part, by using the snowball interview technique—namely, the participants suggested additional participants that might be willing to take part in the study. Several of the study participants know each other. This may bias the research sample. So, the sample may not accurately reflect the actual employee demographics of the DoD OT program.

A related caution is that to decrease researcher bias, the OT case studies are selected from a list of OTs suggested by the participants. While the triangulation process discussed earlier in this chapter gives the researcher confidence that these OTs represented the larger, assumed-homogeneous population of DoD OTs, again, this may bias the sample. So, case studies OTs may not reliably represent the actual population of DoD OTs.

A third caution is that study was exploratory. To the researcher's knowledge, no prior study has systematically considered the research question. No prior study has used historical institutionalism as a theoretical lens for investigating the DoD OT program. There is little quantitative data about the DoD OT program and few studies have tried to unpack the factors that may propel or retard its institutional evolution. The study may be the first to explore the

complex institutional terrain of the DoD OT program using the research design and methods discussed in Chapter 3.

Another caution discussed in Chapter 1 is the researcher is professionally involved in the DoD OT program. The study's findings, and the interpretation and synthesis of the consolidated major findings may have been biased by the researcher's subjective analysis of the study data. This study limitation is discussed in Chapter 3.

As Bloomberg (2012) cautions, interpretation and synthesis is not a linear process. So, interpretation and synthesis of the major study findings involves significant cross-case analysis. Cross-case analysis means that the researcher tries to relate the studies major findings to each other, to the prior literature, to direct quotations from the participants, and to his own perspectives. In doing so, the researcher tries to keep the interpretation and synthesis focused on the research question and the research hypothesis. But the interpretation and synthesis discussions below are not exhaustive. They do not cover everything that the participants said or every significant finding that supported the major findings. Instead, the goal of these discussions is to communicate an interpretive summary of the study. The researcher tries to take what the study finds and discern what it meant; what it tells us about the DoD OT program and what are the institutional factors that are motivating institutional change within the program.

Throughout the interpretation and synthesis process, the researcher is mindful that the study is qualitative research. As with the answer to the research question above, there are multiple ways of interpreting data and the interpretation and synthesis discussion below is only one particular way to understand what is going on with the study data. The subjective nature of qualitative research means that there are multiple potential other ways of interpreting the study data. So, the interpretation and synthesis discussions of the consolidated major findings that

follows is merely one way to understand these findings using the data collected during the study, the prior literature, and the researcher's professional perspectives.

Interpretation of the Consolidated Major Findings

The study's interpretation process includes three steps. In the first step, as discussed above, the researcher prepared consolidated major findings that reflected the major findings from the organization interviews from Chapter 4 and the OT case studies from Chapter 5. Second, the researcher brainstormed potential interpretations of each of the consolidated major findings by asking himself using a question-posing process comprising the dyad "why? /why not?" Thus, for each of the consolidated major findings, the researcher asked himself: Why/why not should there be this consolidated major finding? This inductive question-posing process was repeated to generate insights that might help interpret the consolidated major finding. The result is the interpretation outline tool provided in Appendix II. The researcher uses the tool to help think about rival explanations for the major findings. So, the tool includes citations to the prior literature that the researcher thinks might be useful for interpreting of the major findings.

Third, as reflected in the interpretive discussion below, the researcher uses the interpretation outline tool to interpret the consolidated major findings. The interpretation process proceeds by the relevant analytical framework category and theme. To aid interpretation, the researcher uses the findings roadmaps discussed in Chapters 4 and 5 and that are provided in Appendices BB, DD, and EE. The primary goal of the third step of the interpretive process is to glean additional interpretive insights into the major findings, helping the researcher communicate what the data showed given the purposes of the study discussed in Chapter 1. The researcher

tries to pay attention to areas where the study findings contradicted each other or went beyond the prior literature since these were areas where new lessons might be learned to help the DoD OT program or to contribute to the prior literature. Using these tools, the researcher tries to interpret the finding using the prior literature, and direct quotations from the study participants. These tools aid the interpretation discussion. The researcher's perspective on the major findings are presented in the synthesis discussion.

The following discussion interprets each of the consolidated major findings using selected participant quotations and the prior literature topics. There are 32 consolidated major findings. Appendix HH provides the consolidated major findings. The interpretation discussion below includes the researcher's professional perspectives on four of the consolidated 32 major findings: Major finding (iii) of conceptual category 1; major finding (ii) of conceptual framework category 3; and major findings (i) and (iv) of conceptual framework category 4. So, the researcher's professional perspective on these four major findings is provided here—in the interpretation section—because they are not discussed in the synthesis section that follows the interpretation section. The researcher believes that his professional perspectives on these four consolidated major findings do not add any necessary additional context to the synthesis discussion. So, they are discussed in the interpretation section.

The researcher's professional perspectives on the remaining 28 major findings are provided in the synthesis section. The findings are split up this way because the researcher determined that the synthesis discussion did not need to cover all consolidated major findings. So, the researcher's professional perspectives on four of the consolidated major findings are discussed in the interpretation section below, and for the remaining 28 consolidated major findings, the researcher's professional perspectives are discussed in the synthesis section below.

The interpretation discussion is organized by conceptual framework category, interview question, and then according to the major findings that apply to the interview question.

Conceptual framework category 1: OT award

Interview Question 1 is used to collect data under conceptual framework category 1.

Interview Question 1 seeks to figure what participants believed were the institutional and other factors that influence the decision to use an OT instead of a traditional procurement agreement. Participants discussed three primary factors they think influence the decision to use an OT instead of a traditional procurement agreement. These factors, as reflected in the consolidated major findings provided in Appendix HH, are:

- i. DoD organizations select OTs instead of TPAs to help field advanced technology capabilities and to work with nontraditional contractors.
- ii. OTs offer flexible terms and conditions, for instance, the government can accept funding from the contractor.
- iii. Successful OT negotiations depend on the parties' prior experience with OTs, mutual trust, open communications, flexibility, and understanding each other's legal and business needs.

The following discussion provides added perspectives on these consolidated major findings using selected direct quotations from the participants and by considering the prior literature topics.

DoD organizations select OTs instead of TPAs to help field advanced technology capabilities and to work with nontraditional contractors

The first consolidated major finding under conceptual framework category 1 is: DoD organizations select OTs instead of TPAs to help field advanced technology capabilities and to work with nontraditional contractors. Participants believed that the decision to select an OTs was motivated by the need to increase access to advanced technologies, notably, technologies from nontraditional contractors. OTs are a method for attracting nontraditional contractors that are averse to the DoD procurement system. One participant, for example, explained how the need to use OTs for this need is situation-specific.

It's my understanding that it really depends on the situation, meaning if it's something where we really need commercial industry to participate and we need more flexibility, and we're trying to attract nontraditional firms, then an OT arrangement might be more attractive in order to get to those nontraditional companies (DARPA2).

Another participant emphasized the nexus between the need for innovative technologies and the decision to select an OT.

The fact that should influence it is how badly I want that technology. As we keep ourselves warm with these regulations that comfort us, how willing will DoD be to leave the comfort of the regulations in order to get the technology that they want, because they otherwise couldn't get? I think that should influence when an OT is appropriate. Because the safeguards were created over time for a reason. It's a (sic) really, OTs perhaps are not appropriate for commodity purposes but for unique, cutting-edge or novel technologies (DPAP).

These and other participant remarks for this consolidated major finding are consistent with the prior OT literature. For example, the literature discusses how OTs are useful for attracting nontraditional contractors to do business with DoD (Kuyath, 1995; GAO, 2000; Bloch,

2002; Stevens, 2016). As a result, OTs enable DoD to field advanced technology capabilities (Dunn, 2009; Stevens, 2016). Thus, this consolidated major finding appears to show OT literature that finds OTs beneficial because of their ability to attract nontraditional contractors and to help DoD field new advanced technology capabilities.

This consolidated major finding also shows a source of potential endogenous institutional change that may be reflected in the historical institutionalism literature. For example, Coombs (1999) discusses mutability, internal contradictions, and collective learning as sources of institutional change. Here, collective learning—knowledge shared amongst DoD employees about the usefulness of OTs to attract nontraditional contractors—may be a source of institutional change, wider use of OTs.

Schmidt's (2008) discussion of discursive institutionalism may apply to this consolidated major finding. Schmidt believes that employees use their foreground discursive abilities—personal decisions that deviate from established rules and regulations—to influence institutional change. Here, participants discussed how they use OTs instead of relying on traditional procurement agreements.

It was more we were trying to get some small companies involved, and they didn't like to do business with the government. That's where all your innovation was coming from at that point . . . Then we discovered that most of the companies that had the technology didn't want anything to do with the government contract, so the only other way we could do that was through OTAs (MDA).

Sorensen (2015) discusses that institutional actors exercising discretionary authority can trigger institutional change. Participants discussed how employees are using their foreground discursive abilities and discretionary authority to select OTs hoping this would attract

nontraditional contractors to work with their organization. By exercising such abilities and discretionary authority, participants may be a source of institutional change—wider use of OTs.

OTs offer flexible terms and conditions, for instance, the government can accept funding from the contractor

The second consolidated major finding under conceptual framework category 1 is: OTs offer flexible terms and conditions, for instance, the government can accept funding from the contractor. Most participants believed OTs are more flexible than traditional procurement agreements. OTs are not subject to the myriad rules of the FAR and DFARS. Participants found this frees up the ability of the government and contractor to create an OT that meets the government's technology needs and the contractor's business needs. One participant characterized how this flexibility is favorable to the contractor.

But then, sometimes you do get those performers that haven't worked with the government, and they're kind of uncomfortable with it, and the only way they want to work with the government is if they can get this more flexible arrangement, which hopefully the OT provides the type of flexibility they're looking for. And so that's sort of been the main driver for us for when we would use an OT is when it is specifically requested by the party that's looking to perform (SPAWAR).

Other participants commented on flexibility from the perspective of the government, for instance, how OTs enable tailoring the agreement to meet program needs.

As a CO or an agreements officer you have to be flexible and try to think about what is the ultimate goal for that particular research effort, what are you deriving towards, and what do we need. That's often a conversation I have with the PM. I really need to know very clearly what does he want the performer to accomplish, what technical milestones, what deliverables and what license rights or patent rights does he need at the end for this

to be successful. I really need that clear picture so that I can structure, construct the agreement to ensure that we get that (LF2).

Another participant took a broader view of OT flexibility, discussing how it benefits both parties to the agreement.

It allows significant flexibility between the two parties in terms of how they interact. The ability to have much more flexible financial arrangements, for example, rather than the FAR-based cost proposal, I think it was significantly attractive to our potential partners (RSGS2).

Much as for the first consolidated major finding discussed above, the OT literature cites flexibility as a major advantage that OTs have over traditional procurement agreements. For example, in an early OT article, Kuyath (1995) points to flexible terms and conditions as a major advantage that OTs have over traditional procurement agreement. In particular, flexibility to negotiate customized intellectual property terms is an advantage of OTs. Subsequent OT literature emphasizes how the flexibility of OTs makes them more attractive than traditional procurement agreements for developing advanced technologies (Sumption, 1999; Dunn, 2009; Cassidy, 2013; Steven, 2016; GAO, 2016).

The inherent flexibility of OTs may contribute to institutional change. The historical institutionalism literature discusses how change can accumulate through the processes of layering, displacement, draft, conversion and exhaustion (Beland and Powell, 2016; Kickert and Van der Meer, 2011; Blyth, 2016). Repeated use of OTs by DoD organizations may have a layering effect that, over time, will cause organizational change—wider use of OTs. Beland and Powell (2016) characterize this as incremental change.

Lack of leadership support for OTs may foster policy drift, enabling agreements officers and other street-level employees to use OTs because they believe they are more flexible than traditional procurement agreements (Beland and Rocco, 2016). Thus, the documented flexibility of OTs may make them a lever for gradual institutional change through the processes of layering and drift.

Employees may see OTs as a way around bureaucratic barriers created by the current, highly regulated DoD procurement system. Not only do OTs enable organizations to get better value for the dollar, but OTs also help DoD organization respond to budget pressures and policy initiatives to cut costs. For instance, OTs enable cost sharing by contractors, which is not allowed in traditional procurement contracts.

Successful OT negotiations depend on the parties' prior experience with OTs, mutual trust, open communications, flexibility, and understanding each other's legal and business needs

The third consolidated major finding under conceptual framework category 1 is: Successful OT negotiations depend on the parties' prior experience with OTs, mutual trust, open communications, flexibility, and understanding each other's legal and business needs. Participants discussed how the using OTs goes hand-in-hand with successful negotiations. The more successful OT negotiations are in leading to OT awards, the more that organizations will want to use OTs for future program needs. Participants also discussed that trust between the parties is a catalyst to successful negotiations. For example, one participant explained how the government has to trust the contractor's cost and price information.

Yeah, so detail and transparency. I think when people give you cost estimates, giving it as detailed as possible. When they talk about work, them showing you evidence on what they've done before. Examples of how it's been done before. I think there's a certain amount of trust that has to go into these type of [OT] agreements, and the more you feel they're straight shooting, the more you're willing to accept certain numbers or certain time frames (LF1).

Another participant discussed trust in terms of the parties having to work together to create an agreement starting with a blank sheet of paper. This requires a lot of mutual trust.

It's my understanding that really OT agreements are a blank sheet of paper. It really involves mutual trust between the organizations . . . If people want to trip each other up, then it's very easy to do so because you are starting with that blank piece of paper. Everything has to be negotiated (DARPA2).

Related to trust is the need for open communications between the parties. A participant summed up the need for open communications between the parties:

Probably the biggest one I've learned is open communications. Because it's sort of a clean slate process when you're doing other transactions. So, you have to be able and willing to communicate openly and honestly with your partners, what I call them when I'm doing my other transactions not necessarily as a performer, I refer to them as 'our partners.' So, you want to make sure they are able to communicate openly and honestly, and I find the negotiations that go well are because we are on both sides able to do that (DARPA4).

The OT literature discusses the need for mutual trust and good communications in OT negotiations. Dunn (2009), for example, outlines how OTs promote good dialogue between the government and industry and among industry teams. Other OT literature corroborates this point. For example, the GAO found that OTs foster new relationships and practices within the defense industry, including enhanced communications. Sumption (1999) observes that OTs increase trust between the government and industry.

Although trust and open communications are not specific factors in the historical institutionalism literature, Howlett (2009) and Panizza (2013) discuss how power relationships between institutional actors can be sources of policy change. OTs impact the traditional power relationship between the government and the contractor to foster power parity rather than the traditional superior-subordinate relationship of the government and contractor in traditional contracting. This parity may lead to better communications and to institutional change, wider use of OTs.

Jacobs (2015) discusses another relevant source of institutional change—coalitions for policy change. Jacobs believes that small groups of institutional actors can band together and, over time, effect major policy changes. The enhanced communications, trust, and cooperation that are the hallmarks of OTs may result in coalitions of DoD and contractor personnel working together to foster institutional change—wider use of OTs by DoD. Consortium OTs, for example, may be sources of coalitions for policy change in the DoD OT program.

From the researcher's perspective, the FAR and DFARS institutionalize rules that control, even inhibit, communications between DoD organizations and contractors. This is sometimes a source of delay and friction to both sides during contract negotiations. OTs do not have to follow the FAR and DFARS rules and use their many standard contract clauses. But this means that parties must negotiate the terms and conditions in an OT, requiring good communications between the parties. In addition, mutual trust is required to make up for the lack of the administrative safety net of the FAR and DFARS. So, OTs need experienced negotiators on both sides. Understanding the business case for the OT from the contractor's perspective will help DoD negotiate win-win OT terms and conditions, which smooths the path to OT success.

Thus, mutual trust and good communications are not just desirable in OT negotiations, they are critical requirements for the negotiation to succeed.

For conceptual framework category 1, it is conceivable that these are not the primary factors that influence the decision to select an OT instead of a traditional procurement agreement. The researcher considers what are other primary factors and why? One factor could be DoD leadership pressure to use OTs. Since 2017, DoD leadership has renewed interest in using OTs, particularly in the Military Departments. There is increasing congressional interest in DoD more widely using OTs. The discussion of the NDAA for fiscal year 2018 in Chapter 1 provides excerpts from the SASC committee report that give a sense of congressional interest in this renewed interest. Thus, there may be DoD leadership pressure on DoD organizations and employees to select an OT instead of a traditional procurement agreement.

Another factor could be that OTs have more flexible, typically lower competition requirements than traditional procurement agreements. Some DoD organizations leverage other organizations existing consortium OTs to award their OTs. The Army's DOTC consortium OT is an excellent example. So, DoD organizations may select OTs because they can avoid the stringent competition requirements that apply to traditional procurement agreements.

Litigation avoidance is another factor that may explain why an OT is selected instead of a traditional procurement agreement. Participants noted that OTs are not subject to bid protests, claims and other litigation that delays traditional procurement agreement. The researcher has learned that organizations sometimes select OTs to avoid such litigation. Thus, the wish to avoid a time-consuming GAO bid protest or other pre-award litigation may be additional factors impacting why DoD organization select an OT instead of a traditional procurement agreement.

Conceptual framework category 2: OT advantages versus traditional procurement agreements

Interview Question 2 is used to collect data under conceptual framework category 2. Interview Question 2 seeks to figure what participants believed were the advantages of OTs compared to traditional procurement agreements. Participants discussed four primary factors they think are the advantages of OTs compared to traditional procurement agreements. These factors, as reflected in the consolidated major findings provided in Appendix HH, are:

- i. OTs offer simpler and more flexible terms and conditions than TPAs, for instance, changing an OT is easier, and the government can accept funding and in-kind contributions from the OT contractor.
- ii. Fewer rules and regulations apply to OT than TPAs.
- iii. OTs improve communication and collaboration between the parties.
- iv. OTs impact the ability of organizations to attract advanced technology contractors, enabling new technology solutions for mission needs.

The following discussion focuses on the second and third consolidated major findings listed above. It provides added perspectives on these consolidated major findings using selected direct quotations from the participants and by considering the prior literature topics.

OTs offer simpler and more flexible terms and conditions than TPAs, for instance, changing an OT is easier, and the government can accept funding and in-kind contributions from the OT contractor

The first consolidated major finding under conceptual framework category 2 is: OTs offer simpler and more flexible terms and conditions than TPAs, for instance, changing an OT is easier, and the government can accept funding and in-kind contributions from the OT contractor. This consolidated major finding is similar to consolidated major finding (ii) for conceptual framework category 1 (OTs offer flexible terms and conditions, for instance, the government can accept funding from the contractor). The discussion of that major finding also applies to this consolidated major finding. So, no further discussion of the consolidated major finding will be provided here.

Fewer rules and regulations apply to OTs than TPAs

The second consolidated major finding under conceptual framework category 2 is: Fewer rules and regulations apply to OT than TPAs. Several participants discussed that OTs offer the advantage of being subject to fewer rules and regulations than traditional procurement agreements. One participant, for example, explained how rules and regulations impede the success of traditional procurement agreements.

So, I think for us it was there are so many rules and regulations in [a] traditional [contract] that make it really hard to be successful in a partnership. OTs allow more flexibility and, I don't know how to state it in a concise way, but the government has a lot of rules and policies, and they're always weighing down, and if you break one, well, the commercial world doesn't work that way (RSGS3).

OTs address this problem by enabling the parties to negotiate terms and conditions that are not dictated by rules and regulations, but rather are tailored to meet the needs of the project.

It's being able to write your own [OT] terms and conditions. That was a big advantage for a lot of this, and seeing perspectives from another company, because you could actually understand the position they were in, and you could tailor terms and conditions of the agreement, and you weren't so limited by the authority of the FAR and other regulations. I think that's a big advantage over the traditional approach (MDA).

Another participant discussed this advantage from the perspective of nontraditional contractors, observing how the FAR and DFARS regulations impose regulatory requirements that are a barrier to nontraditional contractors doing business with the government.

It seems like the perceived benefits of using OTs are one, that they're flexible, meaning that traditional procurement contracts are subject to the FAR, the Federal Acquisition Regulations, and if you're [the] Department of Defense as we are, then the Defense Federal Acquisition Regulations, the DFARS. Nontraditional companies can perceive these regulations, nontraditional defense contractors to be cumbersome. They don't want to have an approved cost accounting system. They find it (sic) that these regulations are barriers to doing business with the government. An OT removes, OTs (sic) not subject to the FAR and DFARS. You can work together on crafting beneficial terms and conditions . . . Contractors, if they're entering an OT agreement, so they're nontraditionals, and so they like the flexibility of OTs. They can operate much more quickly. There's, like I said, less bureaucratic bureaucracy with OTs, so much nimbler, which I think is attractive to commercial companies (DARPA2).

These and similar participant remarks followed the OT literature which finds that a significant advantage of OTs over traditional procurement agreements is that they are subject to many fewer rules and regulations (GAO, 2000; RAND, 2002). This freedom from rules and regulations enables the government and contractor to create innovative business relationships (Sumption, 1999; Dunn, 2009; Fike, 2009; Stevens, 2016).

Participant remarks and the prior OT literature point to the role of institutional actors—DoD employees and OT contractors—as potential sources of institutional change in the DoD OT program. The historical institutionalism literature views institutional actors as a locus of endogenous change (Sorensen, 2015). Sorensen believes that change will occur where the institutional system provides actors with opportunities for discretion, implementation, or enforcement. OTs appear to offer such opportunities.

Koning (2016) believes that an institution may change because of its interactions with the actors embedded within it. Under what Koning terms as ideational institutionalism, the purposeful behavior of individuals can over time cause significant institutional change. Koning stresses the relevance of individual institutional actors and their ideas as sources of policy change. OTs, with their many fewer rules and regulations, may offer a setting where institutional actors can impact procurement policy change—more extensive use of OTs. Thus, OTs may be a springboard for ideational institutionalism in DoD.

As discussed above, Schmidt (2008) finds that employees can act to change an institution. This is called employee foreground discursive abilities. Using their discursive skills, employees can influence institutional change. Again, OTs, with their lack of rules and regulations, appear to be an ideal environment for DoD employees to exercise their discursive abilities to influence change, wider use of OTs.

OTs improve communication and collaboration between the parties

The third consolidated major finding under conceptual framework category 2 is: OTs improve communication and collaboration between the parties. Related to fewer rules and

regulations, participants discussed how OTs help improve communication and collaboration between the parties—the government and OT contractor. One participant explained how this helps create a partnership between the government and the nontraditional contractor.

So, it [OTs] attracts the nontraditional, but so does making them comfortable that we're not out to take things from them. We really do want a partnership (DARPA4).

Another participant discussed improved collaboration being one of the main advantages of OTs over traditional procurement agreements.

Well, there's flexibility. I think there's a lot more flexibility when using OTs. There's a lot more collaboration obviously underneath the OT authority. There's obviously a price saver because of not having to follow certain processes that are laid out in the FAR (PIC).

Still another participant discussed the benefits of improved communication and collaboration by explaining how this results in enhanced cooperation by the OT contractor.

I think [the OT contractor] they felt that they were getting buy-in because they were talking about the language of the OT, working through the process of going through the termination articles and working out how we're going to do terminations, and who gets to terminate when, and some of that uniqueness that occurs under these OTs that's nice in that regard (RSGS1).

Enhanced communication is an OT benefit cited by the OT literature. Dunn (2009), for example, discusses how OTs promote dialogue between the government and industry and among industry teams. Stevens (2016) and Fike (2009) discuss that OTs enhance communications and foster innovative business relationships between the government and industry. RAND (2002) explains that OTs lead to better project structure through new and innovative business

relationships. From the perspective of the historical institutionalism scholarship, the discussion of Sorensen (2015) and Koning (2016) for the major finding above applies to this consolidated major finding. Participant remarks and the OT literature's discussion on improved communication and collaboration associated with OTs implies dissatisfaction with these processes in traditional procurement agreements.

Jacobs (2015) posits that the range of policy alternatives available to institutional actors can be subject to expansion and contraction. One way this can happen is that over time, new policy instruments are developed or technological change makes new tools available, and ideas from other institutions are introduced. If path dependent policies are perceived to be not working, institutional actors become more likely to undertake the search for new alternatives to tackle these problems. According to Jacobs, negative policy consequences often provoke efforts to expand the range of workable options. OTs may be the policy instrument that DoD institutional actors are turning towards in response the perception that traditional procurement agreements are not working. Jacobs view of how new policy instruments are used reflects the researcher's perspective on this consolidated major finding. OTs are not subject to most of the laws and regulations that complicate traditional procurement agreement negotiations. Many of these traditional regulations—such as cost accounting standards regulations and intellectual property regulations—are sometimes frustrating, not only for the contractor but also for the government negotiators. There are stringent regulations that formalize, and often restrict, communications between the negotiating parties.

Thus, OTs offer both sides a process where they can freely talk to each other about what they need for the project. OT projects involve advanced technologies, and to negotiate the project's technical deliverables requires open communication between the parties. Therefore,

institutional actors—government and contractor—may find OTs to be a workable alternative to using traditional procurement agreements.

OTs impact the ability of organizations to attract advanced technology contractors, enabling new technology solutions for mission needs

The fourth consolidated major finding under conceptual framework category 2 is: OTs impact the ability of organizations to attract advanced technology contractors, enabling new technology solutions for mission needs. This consolidated major finding is like major finding (i) for conceptual framework category 1 (DoD organizations select OTs instead of TPAs to help field advanced technology capabilities and to work with nontraditional contractors). The discussion for that major finding applies to this consolidated major finding. So, no further discussion is provided here.

It is conceivable that fewer rules, regulations, and improved communications and collaboration are not the primary advantages of OT. There may be other important advantages of OTs over traditional procurement agreement. For instance, DoD organizations may use OTs to satisfy the political agendas of DoD and Congress. There is renewed congressional and senior DoD leadership in using OTs to help maintain DoD technological superiority. During the last year, there has been a surge of OT awards by DoD organizations (Doubleday, 2018). Thus, a primary advantage of OTs may not so much be that they have fewer regulations and improve collaboration, but they help DoD organization respond to congressional and DoD leadership pressure to maintain DoD technological superiority.

Conceptual framework category 3: OT disadvantages versus traditional procurement agreements

Interview Question 3 is used to collect data under conceptual framework category 3. Interview Question 3 seeks to figure what participants believed were the disadvantages of OTs compared to traditional procurement agreements. Participants discussed eight primary factors they think are the disadvantages of OTs compared to traditional procurement agreements. These factors, as reflected in the consolidated major findings provided in Appendix HH, are:

- i. Some employees resist change (OTs) because they fear losing control of procurement processes and turf.
- ii. It is uncertain what OT terms and conditions are mandatory versus negotiable.
- iii. OTs take longer to negotiate than TPAs because most terms are negotiable.
- iv. Changes during an OT are time-consuming.
- v. Lack of OT expertise discourages employees from trying OTs.
- vi. DoD's risk-intolerant culture discourages employees from using OTs and punishes OT failure.
- vii. DCMA is unfamiliar with OTs, impeding the wider use of OTs.
- viii. The Army's failed FCS program continues to impact the wider use of OTs by DoD.

The following discussion provides added perspectives on these consolidated major findings using selected direct quotations from the participants and by considering the prior literature topics.

Some employees resist change (OTs) because they fear losing control of procurement processes and turf

The first consolidated major finding under conceptual framework category 3 is: Some employees resist change (OTs) because they fear losing control of procurement processes and turf. The first factor that participants discussed as a disadvantage of OTs was that employees resist using OTs because of fear of giving up control over traditional procurement processes. One participant, for example, characterized fear of losing control over the funding for the agreement.

The other disadvantage it might bring in is that the perceived notion we have little control over the acquisition process as far as day-to-day oversight of the money. And that prevents people from using the OT as an acquisition strategy (DTRA).

Fear of doing something wrong is subsumed under this consolidated major finding. One participant summed up this belief by noting that “It's (OTs) not familiar, you know, the fear that you're going to do something wrong” (PEO-CBD). A Navy participant discussed how contracting officers are risk-averse to procurement processes being outsourced to other organizations. This risk aversion is compounded by their lack of experience and understanding of OTs.

I think throughout the Navy, we don't use it [OTs]. Our labs don't use them very often. It's like this unknown . . . My perspective is I feel like the contracting officers don't know enough and therefore are stuck in their way of doing business, maybe because they don't see the advantages either, or maybe it's a control thing that there's less control. Maybe there's less . . . The contracting stuff's going off-site, so that always is a concern (NAVYHQ).

Another participant approached this consolidated major finding from a different angle, observing that agreements officers may have too much authority. Without checks and balances on their authority, agreements officers may end up hurting the DoD OT program.

Disadvantages is, the only goal that the [OT] statute requires you to do in order to enter production is to basically compete. The downside is the government, the agreements officer otherwise has a full authority to decide unilaterally any decision, any protest, any disagreement. And the downside of that potentially is that no one has yet thought of how to manage that. I feel as it proliferates, there's no control or checks and balance on the contracting officer. And that's a downside I presume will occur once it hits a certain threshold (DPAP).

This consolidated major finding is reflected in the OT literature. For example, Sumption (1999) finds that cultural change is difficult and the lack of knowledge of the benefits of OTs leads to resistance to change. Sumption's observations appear to dovetail with this consolidated major finding. Stevens (2016) identifies challenges remaining in using OTs, including culture, and the lack of OT expertise in the federal government. These problems may underlie this consolidated major finding. Misunderstanding about OTs may also be an impetus for this consolidated major finding. Dunn (2017) asserts there is a profound misunderstanding of the proper use of available contractual instruments for R&D within the DoD and other federal agencies. Here, resistance to OTs may flow from such a misunderstanding of the proper use of available contractual instruments for R&D.

The historical institutionalism literature also bears on this consolidated major finding. For instance, Sorensen (2015) sees institutional actors as a locus of endogenous change. He contrasts two standard institutional characteristics to figure whether a change will occur: Do defenders of the status quo have strong or weak change possibilities; and does the institutional system give actors with opportunities for discretion, implementation, or enforcement. Here,

weak change possibilities may persist because the DoD procurement system offers DoD procurement officials with opportunities to enforce the status quo procurement regulations.

Consistent with Howlett (2009), this consolidated major finding may show a positive feedback mechanism within DoD that maintains institutional equilibria, the persistence of traditional procurement processes. The OT literature shows that positive feedback mechanisms such as this consolidated major finding might help explain why DoD organizations continue to use OTs sparsely (Greif & Laitin, 2004; GAO-16-209, 2016).

It is uncertain what OT terms and conditions are mandatory versus negotiable

The second major finding under conceptual framework category 3 is: It is uncertain what OT terms and conditions are mandatory versus negotiable. The second major finding cites a disadvantage that is not identified in the prior OT literature. The prior literature does not discuss uncertainty about what OT terms and conditions are mandatory versus what terms and conditions can be negotiated. But several participants discussed how mysterious OTs are for many DoD employees. Thus, OTs are an unknown to some employees and this makes them difficult to negotiate. One participant captured the essence of this sentiment by noting the knowledge challenge that OTs impose on many organizations.

To even know about OTs, let alone how do you do one, let alone what are the benefits? How do you set it up? There are all kinds of uncertainties when you're dealing with OTs. For organizations that have no advocate or understanding, I would say it would be way more challenging for those kinds of organizations (DARPA2)

Several other participants discussed this consolidated major finding in practical terms, noting that an OT is drafted from scratch versus a traditional procurement agreement is based on pre-drafted terms and conditions.

A potential disadvantage is that you are crafting that language from scratch whereas the FAR and DFARS have already gone through the process of setting up terms and conditions for different types of situations. You don't really have that all laid out for you (DARPA2).

So, with the OT, you know, we're essentially starting with a blank document, and you know creating an agreement, and the disadvantage is you're going to be using potentially language that maybe hasn't been tried and tested before, at least not with maybe within the government realm (SPAWAR).

Another participant discussed how the wide-open nature of OTs might be a disadvantage, since some of OTs' inherent flexibility makes it hard to negotiate an agreement to meet the specific business needs of each contractor.

It's very difficult to really grasp the advantages of an OT, or there's a lot of discomfort because you're not used to having that sort of wide open negotiation palette. You've got the FAR and the DFARS that you rely on. Those clauses have been written, and there's prescriptions written that say precisely which ones you do and don't put in or ones you have a little bit of flexibility on. So, there are written instructions out there that kind of guide you through putting together contracts and what you can and cannot accept and then cooperative agreements or grants or very simplistic . . . With an OT, when you get in here, you don't have that sort of history or boilerplate to follow that . . . Everyone's got a different perception and a different area of the OT that drives them crazy. All the different commercial vendors. And so, you always feel like you're starting from scratch each time you try to negotiate one of these (RSGS2).

The prior OT literature supports this consolidated major finding. For instance, Cassidy (2013) emphasizes that the skill of the negotiating parties is critical to ensuring the success of the OT for both sides. Here, several participants stated that DoD organizations and employees lack

enough skills to negotiate OTs. As mentioned above, Stevens (2016) identifies challenges remaining in using OTs, including culture, training for OT officials, and lack of OT expertise in the federal government. Further, uncertainty about what terms of an OT are negotiable shows that training and lack of OT expertise remain as potential roadblocks to the wider use of OTs.

The historical institutionalism literature supports this consolidated major finding. From an employee perspective, Schmidt (2008) proposes discursive institutionalism as a theory of endogenous institutional change to complement established theoretical approaches such as historical institutionalism. The process by which institutional actors—for instance, DoD employees—support an institution is called background ideational abilities. Background abilities include the employee's understanding and compliance with established institutional processes and norms. Here, participants inferred that DoD employees are comfortable in using their background ideational abilities to continue to rely on traditional procurement agreements.

This inference follows what Koning (2016) conceptualizes as ideational institutionalism, finding that institutional starting conditions are not enough to explain institutional change. People and ideas can change an institution. Here, employees may not act to change DoD to use OTs more widely because they do not understand what are the mandatory OT terms and conditions.

This consolidated major finding suggests that path dependence on traditional procurement agreements may be institutionalized because of insufficient knowledge about OTs. Greif (2004) theorizes that institutional actors will continue to follow customary practices based on limited knowledge, limited attention, and coordination costs. Institutionalized rules enable individuals to choose behavior for complicated situations. People are likely to rely on past standards of conduct to guide them and to continue following past patterns of self-enforcing

behavior. Here, employees and organizations will continue to support customary procurement practices because they lack knowledge and the time to figure what OT terms and conditions can be negotiated. The institutionalized federal procurement regulations enable employees to negotiate complex procurement needs.

From the researcher's perspective, there is no list of mandatory OT terms and conditions. Participants worried that they will inadvertently violate a federal law by not including mandatory terms and conditions to carry out the law in the OT. Participants suggested that boilerplate OT terms and conditions would be useful, for instance, for specialized project needs such as aircraft flight risk and intellectual property. In contrast, the FAR and DFARS provide pre-drafted clauses for every mandatory legal and regulatory requirement of the traditional procurement process.

Automatic contract writing systems are used to generate traditional procurement contracts. For example, many DoD organizations rely on the Standard Procurement System, Procurement Desktop-Defense (SPS/PD2) (Hall, 2017). The resulting contract includes the required mandatory terms and conditions. In contrast, OTs start with a blank sheet of paper. There is no automatic agreement writing system for OTs. Thus, a traditional procurement agreement can be generated by a contract writing system such as SPS/PD2. There are no automatic OT writing systems or templates. Employees often lack the time, expertise, and practical expertise to draft a complicated agreement such as an OT starting from a blank sheet of paper. Therefore, this consolidated major finding reflects inherent disadvantages of OTs related to generating the first draft of the agreement.

OTs take longer to negotiate than TPAs because most terms are negotiable; Changes during an OT are time-consuming

The third consolidated major finding under conceptual framework category 3 is: OTs take longer to negotiate than TPAs because most terms are negotiable. The fourth major finding under conceptual framework category is: Changes during an OT are time-consuming. These consolidated major findings are interpreted together because they are similar. Major findings three and four both show participants' belief that OTs are more time-consuming to negotiate and administer than TPAs. Thus, interpretive discussion of these two major findings is combined. Several participants discussed how OTs take longer to negotiate and administer than traditional procurement agreements.

So, and this is the OT myth that just needs to be dispelled, they [OTs] take more time . . . It typically takes more time to get an OT in place with a nontraditional especially if it's their first time than it does kick out a standard contract to a traditional where, you know, they've received 10,000 of these they know everything in those terms conditions and conditions (DARPA4).

It takes a very long time, so a very simple impact is that OTs, I would say, on whole, once you've got the system down, I shouldn't say, because the first ones you do, they're going to take just as long as you do the contract (DPAP).

However, from a perception standpoint, the disadvantage is you're starting from a clean sheet of paper. That can be good; that can be bad. When you're starting with a blank sheet of paper, it could take more time to establish those terms and conditions that need to be a part of the agreement (SOCOM).

Employees new to OTs may be surprised that they take longer given the general anecdotal belief that OTs are quicker to negotiate traditional procurement agreements. A participant noted that when an employee finds out about this they might not like OTs.

It [OT] draws out the negotiation process for those to the point that I think a lot of people who are not familiar with them, like some program engineers may not like them if they see this track record of them taking longer than a normal FAR-based contract to get awarded because it's all open to negotiation and it's a lot of going back and forth (RSGS1).

Another participant discussed how OTs taking longer is exacerbated because the government rarely gets as much information as needed from the contractor during negotiations.

So, those same disadvantages that it [OT] takes more time, you don't have a structured approach. You have to get comfortable with the fact that you aren't going to get the cost of pricing in the way that you're used to it all of the FAR, you just have to get your head in the right place and put that in the right place in terms of risk and reward (DARPA4).

That OTs take longer to negotiate than traditional procurement agreements is not reflected in the OT literature. This may account for anecdotal belief in the DoD procurement community that OTs are faster to negotiate than traditional procurement agreements. But the OT literature implies that OT can be more challenging to negotiate than traditional procurement agreements, so may take longer. For instance, Dunn (2009, 2017) discusses that OT negotiations start with a clean sheet of paper, and so OTs need preparation and a well thought out program. Dunn recommends that DoD may need to go as far as establishing new offices dedicated to innovative contracting. Dunn may be tacitly admitting that OTs are more complex and time-consuming to negotiate than traditional procurement agreements, requiring dedicated offices and employees trained in advanced R&D agreements. Following this, ONR (2017) states that OTs are time-consuming to negotiate. ONR points to intellectual property rights and cost or price reasonableness analysis being challenge areas of OT negotiations, implying that it may take longer to negotiate these areas than in traditional procurement agreements.

The historical institutionalism literature's discussion of path dependence applies to this consolidated major finding. For instance, as part of his overall review of path dependence, Greif (2004) attempts to explain institutional stability. He theorizes that institutional actors will continue to follow customary practices based on limited knowledge, limited attention, and coordination costs. Institutionalized rules enable individuals to choose behavior for complicated situations. People will continue to rely on the customary rules of conduct to guide them. Here, the knowledge that OTs take longer to negotiate than a traditional procurement agreement may bias busy employees to continue to follow customary practices, traditional procurement agreements.

Torring (2009) discusses that path dependence—institutional inertia—is reinforced over time by positive feedback mechanisms, resulting in sedimentation of rules, norms, and values. He underscores understanding the historical dynamics that produce and reproduce these entrenched policy paths within institutions is important to explain why policies are difficult to change once they are in place. Here, well established FAR and DFARS processes for negotiating traditional procurement agreements may stay sedimented if employees learn that OTs take longer to negotiate and administer.

Lack of OT expertise discourages employees from trying OTs

The fifth consolidated major finding under conceptual framework category 3 is: Lack of OT expertise discourages employees from trying OTs. Related to the previous major finding, participants also believe a lack of OT expertise discourages employees from trying OTs. One participant summed up this consolidated major finding as follows.

It [OTs] just takes a lot of effort to get it into place, you know, because there's not quite that level of expertise typically within your command or even, you know, even within your agency in general, and so I don't know what to do (SPAWAR).

Several other participants characterized this consolidated major finding as meaning that seasoned contracting professionals are needed to negotiate an OT agreement.

I think it requires a much higher level of expertise where you really need seasoned contracting professionals to know what to look for as they're crafting and then also go through the time and effort of actually crafting an agreement from whole cloth (AFHQ).

I think it comes down to that is that one, there's just not a lot of experience with it. Like I said we've only done one [OT]. And, based upon that experience, we're learning and kind of developing and figuring out how to do it, but it's still I think that fear of the unknown and the potential liability when you've got other contracting methods that are well traversed, maybe more complicated, but safer probably for the contracting officer (AFRL).

An added participant related this consolidated major finding to the type of DoD organization, noting that R&D organizations may have an easier time negotiating OTs because they have done lots of them.

I think that's probably the biggest drawback to an OT is that it's the dark side of the flexibility; it's that you've got enough flexibility to do something stupid. The mitigation against that is that you need a lot of expertise to know what's a good idea and not a good idea. I think probably in a research organization that probably does a lot of OTs, and that has developed its own even informal forms that they can rely on where they know oh, we ordered an OT last year that's a lot like what we're wanting here. Let's dust that OT off and maybe tweak it here or there for things that it turned out weren't quite right in that agreement and then fix it to be a little bit better for this particular circumstance (AFHQ).

Another participant discussed this consolidated major finding in terms of employee workload and training. Without enough training, employees may believe they are on their own when negotiating their first OT.

It's this one-off thing [OT] that's usually a tiny part of your workload, and you don't know what you're doing. There isn't real firm training out there, right? So, you're left on your own swimming around on an island trying to figure out; you may even have legal support and some of those places that have never experienced [OTs] themselves (DARPA4).

This consolidated major finding is reflected in the OT literature. Stevens (2016), for example, identifies challenges that remain in using OTs, including lack of OT expertise in the federal government. Sumption (1999) finds that cultural change is difficult and the lack of knowledge of the benefits of OTs leads to resistance to change. Thus, for this consolidated major finding, lack of OT expertise and lack of understanding of the benefits of OTs may account for employees becoming discouraged to try OTs.

The historical institutionalism literature also bears on this consolidated major finding. Clemens (1999) discusses that a loose set of institutional rules rather than mandatory rules leads to more institutional mutability and thus to endogenous institutional change. Participant remarks suggested that there are no established institutional rules—for instance, helpful procurement regulations—to guide OTs. This indicates that the DoD OT program may be mutable. Following this, Sorensen (2015), discusses that where institutional rules allow a range of interpretation, institutional change may occur even without the formal revision of rules through the way the rules are implemented or by compliance. Here, employees may believe institutional rules embodied in the FAR and DFARS do not allow enough range of interpretation to stray outside their limits and try OTs.

Greif (2004) discusses institutional stability. He theorizes that institutional actors will continue to follow customary practices based on limited knowledge, limited attention, and coordination costs. Institutionalized rules enable individuals to choose behavior for complicated situations. People are likely to rely on past rules of conduct to guide them and to continue following past patterns of self-enforcing behavior. Again, this consolidated major finding may show that employees are comfortable with and will continue to use traditional procurement rules based on limited knowledge attention and coordination costs.

This view of institutional stability is consistent with Coombs (2008) who posits that corporate KMPs institutionalize routines, which generate innovation. Applying this idea to the DoD OT program and to this consolidated major finding, traditional procurement regulations may KMPs that have institutionalized routines to generate compliance rather than innovation.

Schmidt (2008) discusses the process by which institutional actors support an institution using that he calls background ideational abilities. Background ideational abilities include the employee's understanding and compliance with established institutional processes and norms. By making sense of these processes and norms, and following them, employees contribute to maintaining institutional stability. Here, this consolidated major finding evokes the idea of background ideational abilities of employees in the DoD OT program. By understanding and complying with established procurement regulations or processes, these employees contribute to maintaining the stability of the DoD OT program. But stability comes at a cost—less use of OTs.

DoD's risk-intolerant culture discourages employees from using OTs and punishes any OT failure

The sixth consolidated major finding under conceptual framework category 3 is: DoD's risk-intolerant culture discourages employees from using OTs and punishes any OT failure. As discussed in Chapter 1, DoD is a large, complex institution. Many laws, regulations, policies, and other institutional processes that have been in place for decades govern it. This is particularly true of the DoD procurement system, which codifies hundreds, if not thousands, of procurement processes that must be followed in traditional procurement agreements. DoD has several investigative organizations that oversee compliance with mandatory procurement processes, for instance, the DoD IG, discussed in Chapter 1.

Participants are embedded within the institutional hierarchy of DoD and thus are habituated to be risk-averse for procurement actions. It is unsurprising that participants believed that DoD punishes failure, and that this discourages employees from trying anything new such as OTs. One participant summed up this situation by noting that the roadblocks to the broader use of OTs comes down to two factors, "Culture and leadership" (LF2).

Specific to OTs, another participant discussed that OTs might be seen as riskier than traditional procurement agreement because they are not subject to any procurement regulations. The participant characterized the predisposition for employees to rely on established procurement regulations as "FAR-minded thinking":

I think from a contracting, legal perspective; I think some might see it as riskier because there . . . You know; you're not bound by the FAR. 'Okay, well then what are my rules?' In some respects, that's turned into what we like to call FAR-minded thinking (DOTC).

Another participant discussed OTs as being the “Wild West” of DoD procurement because they lack administrative safeguards. This makes OTs ripe for abuse.

Another disadvantage is as I mentioned, there are people that are concerned that there are no safeguards because of they're not subject to the FAR and DFARS. There's real concern. We're in procurement, and people like to audit the procurement world. Whenever you're in a situation, like I said, where there's a perception that OTs are the wild west and anything goes, it could be a situation ripe for corruption, fraud, waste, and abuse, those kinds of buzz words (DARPA2).

About culture, another participant discussed how OTs could expose the government to legal risks and erode public trust in the government.

Terms that harm government interest. If not handled properly, an OT may expose the government to a lot of legal risks; might erode public trust. I can see there are concerns about integrity in that way (DARPA1).

A participant discussed how some DoD organizations strictly enforce procurement regulations so as not to repeat mistakes from the past.

I think it's the fear of . . . Ignoring the lessons very hard learned in the past. I think in other organizations . . . Because of the nature and the dollar size, I think there's much more rigid enforcement by management (DARPA3).

But an added participant reflected that if DoD is to change how it uses OTs it must first address its established culture of risk intolerance. “We have to change that audit and risk culture around DoD procurement if we are going to effectively use OTs” (DIUX).

The historical institutionalism literature suggests that positive feedback mechanisms might help explain why DoD organizations continue to use OTs sparsely (Greif & Laitin, 2004;

GAO-16-209, 2016). Following this, the OT literature implies that cultural factors such as administratively punishing failure and an institutional emphasis on auditing and inspections, are positive feedback mechanisms that perpetuate DoD employee choosing traditional procurement agreements instead of OTs (Dunn, 2009, 2017).

The historical institutionalism literature further relates to this consolidated major finding. For example, Panizza's (2013) and Howlett's (2009) discussions of power relationships between institutional actors as a source of path dependency are evocative of participant remarks for this consolidated major finding. Agreements officers and program manager are powerless against DoD auditors and senior DoD officials. DoD's culture of risk-intolerance and punishing failure may show the long-established power asymmetry between employees charged with carrying out procurement and the DoD organizations such as the DoD IG and DCAA that oversee these employees.

The mission of DoD is to "provide combat-credible military forces needed to deter war and protect the security of our nation" (DOD(NDS), 2018, p. 1). This mission is not designed to tolerate failure, and the institutional culture manifesting the DoD mission is reflected in the DoD procurement system. Since OTs are meant for developing advanced technologies where there is a high risk and high reward, OTs sometimes fail. Given the culture of risk intolerance and punishing failure, it is unsurprising that employees are hesitant to do something as risky as using OTs more widely.

DCMA is unfamiliar with OTs, impeding wider use of OTs

The seventh consolidated major finding under conceptual framework category 3 is:

DCMA is unfamiliar with OTs, impeding wider use of OTs. DCMA publicizes its mission as:

“We are the independent eyes and ears of DoD and its partners, delivering actionable acquisition insight from the factory floor to the front line around the world” (DOD(DCMA), 2018).

DCMA’s mission includes administering contracts and agreements awarded by other DoD organizations. “After contract award, DCMA monitors contractors' performance and management systems to make sure that cost, product performance, and delivery schedules are in compliance with the terms and conditions of the contracts” (DOD(DCMA), 2018). DoD organizations that award traditional procurement agreements and OTs can request DCMA to administer the agreement on their behalf. So, DCMA plays a vital role in representing DoD to make sure that agreements, including OTs, are performed under their terms and conditions.

Participants, however, found that DCMA is unfamiliar with OTs and that this may make DCMA employees reluctant to administer OTs on behalf of their organizations.

We rely in this agency [DARPA] on DCMA to help us administer our awards. DCMA is not versed in OTs. They do not understand them . . . I remember last year I got, I don't know how familiar you are with this, but we get contract efficiency reports every once in a while, issued by DCMA, which is when they look at a contract, and they don't find a particular clause there or what have you. I got issued what we call a CDR (Contract Deficiency Report) by a DCMA ACO who called me up and said this was the worst contract they'd ever seen written, didn't have any FAR clauses or DFARS clauses . . . I said it's because it's an OT, so there are no FAR [clauses] . . . [DCMA] was like, what's an OT? They [DCMA] had their own learning curve. They had not administered one before (LF2).

This consolidated major finding reflects the OT literature's focus on lack of training as a problem impeding the wider use of OTs. Dunn (2009), for example, points to the lack of training as part of the problem holding back wider use of OTs. Stevens (2016) identifies training and lack of OT expertise in the federal government as challenges for the DoD OT program. Therefore, DCMA may need more training and expertise to effectively administer OTs for other DoD organizations.

This consolidated major finding is reflected in the historical institutionalism literature. For example, where path dependence occurs, each step along an established institutional pathway makes the costs of institutional change higher. Thus, passaging time sediments established institutional arrangements in place by making it administratively or politically harder to switch to alternative institutional paths (Pierson, 2000; Schreyögg & Sydow, 2009). Sedimentation of established institutional arrangements may account for DCMA's ignorance of OTs, even after many OTs have been awarded by DoD organizations over the last several decades. DCMA's relative lack of knowledge of OTs may lead to resistance to change its culture to be more knowledgeable about OTs (Sumption, 1999). DCMA employees are unfamiliar with OTs because they have not been trained to review them. DCMA has a long institutional history of administering contracts, not OTs. So, DCMA may be path dependent on administering traditional procurement agreements.

The Army's failed FCS program continues to impact wider use of OTs by DoD

The eighth major finding under conceptual framework category 3 is: The Army's failed FCS program continues to impact wider use of OTs by DoD. Despite occurring well over a

decade ago, the specter of the Army's failed FCS program continues to impede the more extensive use of OTs in DoD. As discussed in Chapter 3, The FCS program included an OT between the Army and Boeing. Although the OT did not cause the program's failure, there was negative congressional attention to the program, including the program's use of OTs (Project on Government Oversight (POGO), 2017). There was a congressional hearing on the FCS program, spearheaded by Senator McCain and that eventually led to the termination of the program. The FCS experience made a lasting impression on DoD leadership, putting a sour taste in their mouths about using OTs. Several participants remarked about the FCS experience as being a disadvantage of OTs.

Everybody knows about FCS and some of the programs where it was abused and tarnished the model, and it's taken a while to come back from that (DOTC).

The concern is that once people start recognizing that it's a better way of doing business that OTs are going to grow exponentially, whether it's for individual projects or the applications consortia, the concern is, they start screwing up . . . There isn't the experience across the DoD contracting agencies, and everyone is going to reinvent the wheel and reinvent potentially an approach that could give OTs a black eye, much like we had the experience with FCS (OSD).

I will tell you what I always hear. Always, every General [Officer] that I brief. "Well you know we're going to use an OT, what about FCS? . . . I'm not sure about all the particulars but that, when I get to the General level, the one, two, three-star level, that's what I'll hear, right off the bat, is so we're using OT again? What about FCS? . . . That's a big one that I hear often (PIC).

The OT literature discusses the FCS experience. Dunn (2000) provides case studies of notable OTs. This includes a short case study of the Army's FCS OT. Nevertheless, Dunn explains that the FCS OT was not a failure. Instead, it was a victim of politics—opposition by Senator McCain.

While not focusing on FCS, Sumption (1999) recommends that DoD leadership should be at the center of changing institutional culture to increase use of OTs. She concludes that leadership at all levels of industry and DoD must support and focus on cultural changes needed to carry out OTs. Following Sumption, DoD leadership could help put an end to the stigma of FCS and so assist the DoD OT program move forward.

The historical institutionalism literature shows that the FCS program's negative impact on the DoD OT program may be an example of path dependence in the DoD OT program. Sorensen (2015), for instance, discusses that in path dependence, early established institutional processes become locked-in, and so small choices early on can have enduring institutional impacts. The passage of time sediments established institutional arrangements in place by making it administratively or politically harder to switch to alternative institutional paths (Pierson, 2000; Schreyögg & Sydow, 2009). Here, the perception that FCS failed due to its OTs has become sedimented in the institutional memory of DoD, impeding the more extensive use of OTs in the present.

Torfing (2009) discusses path dependence as institutional inertia reinforced over time by positive feedback mechanisms, resulting in sedimentation of rules, norms, and values. He underscores understanding the historical dynamics that produce and reproduce these entrenched policy paths within institutions is critical to explaining why policies are difficult to change once they are in place. Here, the historical dynamics caused within DoD by the failure of the FCS program continue to reverberate to the present and may create path dependence on traditional procurement agreements, perpetuating resistance to using OTs.

For conceptual framework category 3, it is conceivable, however, that the disadvantages of OTs discussed by participants and reflected in the factors above are not the most important

disadvantages of OTs. There may be other factors that are more critical disadvantages of OTs compared to traditional procurement agreement. The OT literature cites other disadvantages to OTs that were not discussed by participants. For example, Bloch (2002) explains that most OTs are awarded to traditional contractors, not nontraditional contractors. Dunn (2017) discusses that more flexible fiscal laws are needed to encourage the wider use of OTs. Stevens (2016) observes there is no automatic OT writing system as there is for traditional procurement agreements. Fike (2009) discusses that a lack of counterfactual analysis of OTs, that little research that has been done to show whether a traditional procurement agreement would have been a better choice than an OT for specific programs. Study participants did not discuss these factors significantly. Therefore, the OT literature cites disadvantages of OTs that were not identified by participants, and these disadvantages may be more critical disadvantages than those identified by the participants.

Conceptual framework category 4: Numbers of OTs versus traditional procurement agreements

Interview Question 4 is used to collect data under conceptual framework category 4. Interview Question 4 seeks to figure what participants believe explains DoD's numbers of OTs compared to traditional procurement agreements. Participants discussed nine primary factors they think explain DoD's numbers of OTs compared to traditional procurement agreements. These major findings, as reflected in the consolidated major findings provided in Appendix HH, are:

- i. TPAs are appropriate for most DoD requirements.

- ii. OT advantages such as speed to award impact the numbers of OTs.
- iii. Employee workload impacts the numbers of OTs.
- iv. Organizations with R&D missions have higher numbers of OTs.
- v. DoD leadership insufficiently supports OT.
- vi. There are insufficient training and policy guidance for OTs.
- vii. The resources and creativity needed to negotiate OTs cause more TPAs.
- viii. Employees are used to relying on familiar procurement regulations and policies.
- ix. Employees are risk-averse to try new procurement processes such as OTs.

The following discussion provides added perspectives on these consolidated major findings using selected direct quotations from the participants and by considering the prior literature topics.

Traditional procurement agreements are appropriate for most DoD requirements

The first consolidated major finding under conceptual framework category 4 is: Traditional procurement agreements are appropriate for most DoD requirements. OTs are intended for prototype projects, thus are mostly used for R&D work. Conversely, traditional procurement agreements are designed for procuring goods and services that are used by DoD organizations. This can range from low cost, consumable office supplies to major weapon systems such as the F-35 joint strike fighter. The OT statute is used to authorize OTs, while the FAR and DFARS are used to approve most traditional procurement agreements. Participants

understood these distinctions, and several participants characterized these distinctions contribute to the low numbers of OTs compared to traditional procurement agreements.

I think it's that the FAR system is set up for volume where it's written to cover the vast majority of the things that DoD organizations want to enter into agreements with organizations to do, and so I think it gets most of what needs to be purchased. The FAR is written to accommodate that. I think OTs are useful for edge cases and some situations where the broader mainline contracting approach just isn't well suited (AFHQ).

I think that just probably just from fundamentally the way it's structured; OTs focus on developing additional capabilities from largely nontraditional defense contractors. It's a fairly specialized tool, and it takes a lot of skill to effectively use. I think that just leads to it probably just not being used all that much and not that many OTs being awarded (AFHQ).

Obviously, OTAs are limited to R&D. So, one of the things we've talked about is, why can't there be an OTA for everything? All types of actions. I don't know the answer to that question. Could you have an OT for services? You know, I guess it gets back to the fundamental purpose. We're not here to circumvent the FAR. We have to be careful that we don't give that appearance. There are reasons why those rules are in place for procurements and other things that are acquired by the DoD (DOTC).

Most participants believed that there are many fewer OTs than traditional procurement awarded each year by DoD. But participants, however did not know specific numbers. In addition, participants believed the numbers of OTs will rise as DoD organizations and employees become more familiar with the advantages of OTs.

I would say the great majority [of agreements awarded], and I'd have to look at the numbers from last year, are definitely FAR-based contracts, cooperative agreements. They're not OTs (LF2).

Their numbers [OTs] are small right now but will increase. And as they increase, then the number of FAR-based contracts will decrease (PEO-CBD).

Participant remarks reflect the OT literature. For example, in 2016, the GAO conducted a government-wide survey of the federal agency use of OTs (GAO-16-209, 2016). The survey covers OTs awarded by federal agencies during fiscal years 2010-2014. The GAO finds that most agencies use OT sparingly and that ten of eleven agencies reported that OTs are used in less than 5% of overall procurements. DoD reported it uses OTs about 10% as much as traditional procurement contracts. These numbers seemed to be consistent with participants' remarks about the relative numbers of OTs compared to traditional procurement agreements.

The historical institutionalism literature on policy drift is also relevant to this consolidated major finding. Beland and Powell (2016), for example, discuss that policy drift is prevalent in institutions where there are significant political or institutional barriers to change. Here, participant remarked that large institutional barriers to change remain—using OTs more widely. Thus, the gradual increase in the number of OTs awarded by DoD may reflect policy drift rather than any policy effort to make more extensive use of OTs.

On the other hand, this consolidated major finding may show gradual endogenous institutional change within DoD. Kickert (2011) argues that historical institutionalism is suitable for explaining incremental, gradual transformations within an organization. Kickert observes that most organizational change is gradual but can accumulate and cause a significant change. Although historical institutionalism focuses on path dependency, Kickert emphasizes that historical institutionalism is congruent with the idea that organizations can gradually change. Here, the relative numbers of OTs compared to traditional procurement agreements may be an indicator of gradual change within DoD. So, although there may be a change in DoD usage of OTs, this change may be consistent with Kickert's idea of gradual endogenous change. This

means that the numbers of OTs could be gradually increasing while DoD remains otherwise path dependent on traditional procurement agreements.

From the researcher's perspective, participant remarks for this consolidated major finding show that most DoD requirements are for goods and services, and that these requirements are best fulfilled by using traditional procurement agreements. DoD organizations are familiar with how to buy goods and services using the established FAR and DFARS procurement processes. Traditional procurement agreements are suitable for purchasing many goods and services, ranging from office supplies to major weapon systems. Thus, participant remarks for this consolidated major finding reflect familiar precepts of federal procurement and the DoD procurement system. While participants did not know specific numbers of OTs compared to traditional procurement agreements awarded by DoD, most believed there were many more traditional procurement agreements awarded than OTs. This disparity may reflect that most of what DoD buys is goods and services, not R&D prototype projects.

OT advantages such as speed to award impact the numbers of OTs

The second consolidated major finding under conceptual framework category 4 is: OT advantages such as speed to award impacts the numbers of OTs. This consolidated major finding is like major finding (iii) for conceptual framework category 3 (OTs take longer than TPAs because most terms are negotiable). The discussion for that major finding also applies to this consolidated major finding. Thus, no further substantive discussion will be provided here.

As discussed above, participants observed that OTs take longer to negotiate than traditional procurement agreements. This surprised the researcher since the general anecdotal

belief in the DoD procurement community is that OTs are desirable because they are faster to award. Unsurprisingly, however, participants noted that speed toward is typically a desirable characteristic of any DoD agreement, and that speed drives what type of procurement instrument is selected for a particular project. Contracting officers and agreements officers are often under pressure to award agreements quickly so that the program can get underway and carry out its objectives. If OTs take longer to negotiate than traditional procurement agreements, this will deter busy contracting officers and agreements officers from choosing to use an OT instead of traditional procurement agreement.

Despite this consolidated major finding, one factor that weighs in favor of OTs is that they are not subject to litigation such as GAO protests (Dunn, 2009, 2017; GAO, 2000). As discussed in Chapter 1, there is a low probability of claims and related litigation during OT administration. Thus, from a litigation perspective, OTs may be faster than traditional procurement agreements because they are less likely to be mired in litigation than traditional procurement agreements. The low litigation risk for OTs can be an attractive feature that may convince agreements officers that to select an OT over a traditional procurement agreement. Without the potential for litigation, agreements officer may conclude the OT is overall faster to award and start work than a traditional procurement agreement.

Employee workload impacts the numbers of OTs

The third consolidated major finding under conceptual framework category 4 is: Employee workload impacts the numbers of OTs. Employee workload impacts the relative numbers of OTs compared to traditional procurement agreements. DoD employees are busy.

Contracting officers and agreements officers face pressure from program managers, their chain of command and from contractors to award agreements as quickly as possible. Thus, employees are biased against using agreements that take a long time to negotiate and award.

As discussed above, participants observed that OTs could take longer to negotiate than traditional procurement agreements. So, participants remarked that this could impact the numbers of OTs compared to traditional procurement agreements because agreements officers are likely inclined to choose agreements that take less time to negotiate and award. One participant, for example, discussed this phenomenon as a “bandwidth issue”:

Doing a lot of them [OTs] at one time can be challenging, right? Because it's a bandwidth issue. Because each one does take time to work through. So, when you're trying to do a lot at one time you just like I mentioned, it's a workload thing. It could possibly get in the way of the other traditional stuff you're doing is suffering because you have to put so much time and effort into work each one of those things, and that's where I am right now (DARPA4).

Another participant noted that agreements officers have to “parse up” their workload, meaning they have to triage their workload to make sure they achieve a level of output satisfactory to their customers and their chain of command.

I think that's the way the contracting officers are thinking about it . . . I know they have to parse up workload . . . I've been told no [to do an OT] by [contracting] agents before. Just because timing would fall at the same exact time, they're going to get other contracts from another program. So, they do have to parse out their workload, and I'm imagining that's a problem for DARPA (LF3).

The OT literature does not discuss the bandwidth issue. But several commentators have noted that institutionalized dependence on traditional procurement agreements persists despite the known advantages of OTs for developing advanced technology solutions for national defense

(Sumption, 1999; Schooner, 2002; Stevens, 2016; Dunn, 2017). Some of this persistence may be because of the bandwidth issue.

Lack of training may contribute to this consolidated major finding. Dunn (2017) sees the lack of training as an impediment to the wider use of OTs. He concludes that DoD employees must be provided with the legislative, regulatory tools, training, delegated authority and encouragement to use innovative contracting methods to meet DoD mission needs. Here, lack of training may cause an increased workload on the agreements officers because they are inexperienced with OTs, resulting in OTs taking longer to negotiate than a traditional procurement agreement.

This consolidated major finding reflects general principles of historical institutionalism. For example, the most important insight of what Koning (2016) terms ideational institutionalism is that institutional starting conditions are not enough to explain institutional change. People and ideas can change institutions. Thus, ideational institutionalism refers to the purposeful behavior of individuals, for example priming and framing, or exogenous factors such as a crisis to explain change endogenous institutional change. Here, people such as agreements officers and program managers lie at the center of the addressing the bandwidth issue. If these types of employees can manage the workload associated with OTs, it may be possible for OTs to be more widely used by DoD. For example, employees such as agreements officers can manage their workloads to award more OTs.

Organizations with R&D missions have more OTs

The fourth consolidated major finding under conceptual framework category 4 is: Organizations with R&D missions have more OTs. When asked about what factors may explain the relative numbers of OTs versus traditional procurement agreements, participants focused on the agency's mission and whether the project is R&D oriented. Participants seemed to be aware that OTs are used less frequently than traditional procurement agreements across DoD.

It really comes down to, to me, what's the agency's mission, what are they seeking to do. If that is the agency's mission, there's no reason they should not be doing it. (LF2).

I think it's primarily just the nature of the research. Each project is different. So, there's a place where there's more use, proper use for OTs in some instances and sometimes they're just not. So, we don't force them when there's no place for them to be. R&D primarily always allow (sic) for them (DARPA4).

Maybe the nature of the work, so the kind of funding they're getting, and what kind of programs that they have in hand, right? So, if people are realizing that because of the problem set out there that now we need to invest more time and money more on the front-end types of stuff like S&T, right? (DARPA4).

I think it comes down to what's the ultimate goal of the contract. How do we want to deal with the technology? Who is it for? At AFRL, it's not necessarily always for an Air Force need specifically. We've got other organizations that kind of use our contracting in our R&D efforts and so we've got to know what our consumer or end user needs out of this contract and based upon that, tailor it (AFRL).

Another participant discussed working at a defense agency that had a lot of R&D work but did not use OTs because of lack of knowledge of and experience with OTs.

When I was at DISA, I wasn't aware of the existence of OT at all, partly because the mission of DISA was not too much into R&D, even though it does have a lot of R&D. They were all done through a FAR-based contract (sic). Could any of those have been done through an OT? Maybe. But because of the lack of the knowledge and experience, it was not used (DARPA1).

An OT contractor participant discussed this consolidated major finding from a different angle than the DoD participants—alignment with the company's business objectives.

Perhaps it's alignment with our business objectives. So, the company is initiated with one business model, and so it's kind of two pieces of our business plan, but the first piece of that business that launched is corporate contract. Where we specifically are working with industrial fermentation companies, and so that's kind of where that focus is going to be. And the DARPA project [Living Foundries], in this case, was something that we've had on our horizon that someday we want to invest in this area because we think it's very synergistic with the technology we're going to build for this other business. But we can't invest in two businesses at the same time. And so, in our case, the OTA work was a way to get the funding to sort of jumpstart this other business that happens to be very in line with the goals of the project (LF5).

This consolidated major finding is reflected in the OT literature. A GAO (2016) survey, for example, finds that most agencies use OT sparingly and that ten of eleven agencies reported that OTs are used in less than 5% of overall procurements. DoD reported it uses OTs about 10% as much as traditional procurement contracts. Consistent with the GAO survey, Sumption (1999) finds that cultural change is difficult and the lack of knowledge of the benefits of OTs leads to resistance to change. As discussed in Chapter 1, OTs account for only a small fraction of DoD R&D spending. In addition, the lack of systematic OT training in DoD is well documented (Dunn, 2009, 2017; Halchin, 2011; S. Rpt. 115-125, 2017). Here, participant remarks appeared to follow the GAO's survey findings and Sumption's comments about lack of knowledge of the benefits of OTs leading to resistance to change.

From the researcher's perspective, OTs are meant for prototype projects, which normally must be funded with R&D funding. It seems indisputable that most DoD OTs are meant for R&D work. As discussed in Chapter 1, R&D work is a small part of the overall DoD procurement budget. DoD organizations are funded with different types of federal appropriations, including R&D funding. But not all DoD organizations have R&D funding. DoD organizations have different missions; some are more focused on R&D than others. For instance, DARPA has a significant R&D mission focus. The Army has a mission focus weighted towards ground combat. With these attributes of OTs, funding and organization missions in mind, it seems logical that organizations with R&D missions and R&D funding will have more OTs than those that do not have this mission focus and funding.

There is insufficient DoD leadership support for OTs

The fifth consolidated major finding under conceptual framework category 4 is: There is insufficient leadership support for OTs. Leadership appears to be a theme that ran through many of the participants remarks, not only for this consolidated major finding but for others as well. One participant, for example, summed up this theme by pointing to what he believed explained the relative numbers of OTs versus traditional procurement agreements in DoD: “I would say leadership” (DPAP). Participants had several additional perspectives on how leadership manifested itself as a factor underlying this consolidated major finding.

I would say that there's not a ton of guidance, I think, that can be relied on, and so I think may be an additional burden to just the expertise required to competently draft and award an OT. I could see there being institutional barriers to using an OT where maybe leadership within organizations are unsure of the rules surrounding OTs or just aren't

confident how it'll be received maybe politically within the organization, that it's may be seen as something unusual and something that they would be maybe called upon to justify just at the outset (AFHQ).

We are a civilian-run Defense Department of political appointees. They turn over with great frequency. Our military senior leaders turn over with great frequency. Successful industries could never operate the way the Defense Department operates . . . The career civilians like myself that end up being in positions for a long time can make a difference, but they are always subject to the whims of the leadership coming in with each administration (OSD).

I've seen a big change in the Army's, in senior leadership in the Army, as far as comfort level with OTs, for the good, and that's been over the last couple years I would say, has been a bigger push with let's consider OTs in our programs of record and that kind of thing, which we didn't typically see before (PIC).

This consolidated major finding has support in the OT literature. Sumption (1999), for example, recommends that DoD leadership should be at the center of changing the institutional culture to increase use of OTs. She concludes that leadership at all levels of industry and DoD must support and focus on cultural changes needed to carry out OTs.

This consolidated major finding is also reflected in the historical institutionalism literature. Lack of leadership support for OTs may cause what Kickert (2011) and Blyth (2016) call policy drift. Here, lack of leadership support for OTs leaves DoD adrift from a policy perspective, and DoD organizations and employees—agreements officers, program managers, attorneys—must use their discursive and ideational abilities to create change in the DoD OT program.

There is insufficient training and policy guidance for OTs

The sixth major finding under conceptual framework category 4 is: There is insufficient training and policy guidance for OTs. Lack of OT training and policy guidance was a theme touched upon by most of the participants. One participant, for example, discussed how the lack of training made sense because of how DoD historically has trained its procurement workforce to only use traditional procurement agreements.

To me, it makes sense that across the board, there are more traditional procurement contracts in place rather than OTs because that's how we're educated. We're training our workforce, beginning with interns on up, [to use] the traditional FAR contracting methods (SOCOM).

Another participant saw the lack of delegated OT authority and lack of OT education as twin factors explaining the relative numbers of OTs compared to traditional procurement agreements.

I think it goes back to who has the authority to execute. Because not every organization or agency within DoD has the authority, right? If you do have the OT authority to execute one, it's lack of education and even misinformation from the previous OT authority guidelines (DTRA).

Other participants tied lack of training and policy guidance to DoD leadership, noting that leadership also suffers from a lack of OT training.

I could see there being institutional barriers to using an OT where maybe leadership within organizations are unsure of the rules surrounding OTs or just aren't confident how it'll be received maybe politically within the organization, that it's maybe seen as

something unusual and something that they would be maybe called upon to justify just at the outset (AFHQ).

When you have large acquisition offices, they function within a much-defined set of regs (regulations), so it's very easy. We're awarding FAR contracts. We're awarding cooperative agreements. This is what we do. We know what to do. We're pretty much negotiating this. You give them an OT for a prototype, and there's a blank slate there. Does the office leadership have confidence that they're going to do what's right for the government? I think that to me has always been why I think a lot of agencies have not totally embraced it yet. I don't think there's been enough very good training and education about them. I've helped train some organizations . . . On the use of OTs, and you can see that they're not there yet. They don't really understand them (LF2).

Still another participant echoed what other participants noted; that everyone—the program management and contracting communities—needs OT training. In addition, the training should be mandatory.

If training was made available to everyone, both in terms of the acquisition and program management community, as well as the contracting community, if it became mandatory training for everyone. I mean, that doesn't solve the problem, but now you start to educate, and people start to understand that there is a tool [OTs] that is out there that can do what they need and probably even more (NSC).

The OT literature supports this consolidated major finding. Dunn (2017), for example, points to the lack of training as part of the problem holding back wider DoD use of OTs. Stevens (2016) identifies challenges remain in using OTs, including training for OT officials and lack of OT expertise in the federal government. GAO officials have testified about the need for DoD to develop adequate OT training and policy guidance. In 2001, for instance, two senior GAO officials testified about these issues before House of Representatives Subcommittee on Technology and Procurement Policy (GAO-01-980T, 2001). Recently, Congress has taken legislative action to require DoD to give OT training to its workforce. As discussed in Chapter

1, in 2017 Congress amended the OT statute to add a requirement for DoD to give OT training to personnel involved awarding and administering OTs.

The Secretary of Defense shall . . . Ensure that management, technical, and contracting personnel of the Department of Defense involved in the award or administration of transactions under this section or other innovative forms of contracting are afforded opportunities for adequate education and training; and establish minimum levels and requirements for continuous and experiential learning for such personnel, including levels and requirements for acquisition certification programs (Pub. L. No. 115-91, 2017, Sec. 863).

Lack of OT training and policy guidance is consistent with the historical institutionalism literature. Howlett (2009), for instance, discusses two new types of policy change mechanisms—neo-homeostatic and quasi-homeostatic change—to help explain institutional change. In neo-homeostatic policy change, small-scale policy changes occur endogenously and build up into paradigmatic change. In quasi-homeostatic policy change, internal policy goals are stable, but exogenously driven changes can cause paradigmatic policy shifts to occur. Here, local OT training initiatives sponsored by DARPA and other DoD organizations may represent neo-homeostatic change. Congress’s enactment of mandatory OT training requirements for the DoD workforce may be examples of quasi-homeostatic change. Chapter 7 discusses training and policy guidance and part of the conclusions and recommendations sections.

The resources and creativity needed to negotiate OTs cause more TPAs

The seventh consolidated major finding under conceptual framework category 4 is: The resources and creativity needed to negotiate OTs cause more TPAs. This consolidated major finding is like major finding (iii) for conceptual framework category 3 (OTs take longer to

negotiate than TPAs because most terms are negotiable) and finding (iv) for Conceptual Category 3 (Changes during an OT are time-consuming). The discussion for those major findings apply to this consolidated major finding. Several participants emphasized the amount of time and effort needed to negotiate an OT. The following are examples of remarks under this theme.

The development of the solicitation that resulted in the OT was also very time consuming because it's different because it's novel and that sort of thing. I think contracts, there's a process . . . Know-how to do the process. There are rules. You can just go look up the rules and that sort of thing. That's my guess is if it's just more cut and dry, then the OT requires creativity (RSGS2).

It's just familiarity. Even if people try to do it [an OT] and then it's reflected that gee, this was a lot of work. The rest of the community probably hears that, and it's a little bit of a disincentive, I guess (RSGS2).

It's been great but doing a lot of them [OTs] at one time can be a bit challenging, right? Because it's a bandwidth issue. Because each one does take time to work through. So, when you're trying to do a lot of them at one time you just like I mentioned, it's a workload thing. It could possibly get in the way of the other traditional stuff you're doing is suffering because you have to put so much time and effort into work each one of those things, and that's where I am right now (DARPA4).

The extra work needed for negotiating and awarding an OT can lead to less of them being awarded than traditional procurement agreements. One participant discussed this in terms of the skill level needed to negotiate an OT.

I think that just probably just from fundamentally the way it's structured, OTs focused on developing additional capabilities from largely nontraditional defense contractors. It's a fairly specialized tool, and it takes a lot of skill to effectively use. I think that just leads to it probably just not being used all that much and not that many OTs being awarded (AFHQ).

Another participant discussed the challenge of finding experienced contracting officers who will try something new such as an OT. The participant suggested that OT templates could help reduce this problem.

I think OT numbers are relatively low I think DoD-wide. And so, I would go back to I think it's the lack of kind (sic) of knowledge, experience, and guidelines. So, knowledge I would say it's not very well known as a tool to be used. Experience, it's difficult to find those experienced contracting officers who are willing to, if they already have established methods of getting stuff done, are willing to go off that beaten path and try something new and have that level of experience to be able to do it. And then, guidelines, I think it would be ideal to have template versions that the contracting officer can pull from. And even legal to look through and say these are the terms they traditionally like to see in this section or here is an ideal OT that we can build upon (AFRL).

The increased resources needed to negotiate OTs is reflected in the OT literature.

Cassidy (2013), for example, emphasizes that the skill of the negotiating parties is critical in ensuring the success of the OT for both sides. Stevens (2016) identifies challenges remaining in using OTs, including lack of OT expertise in the federal government. GAO officials have testified about developing adequate OT training and policy guidance (GAO-01-980T, 2001). Here the challenge of finding enough resources to negotiate OTs might be attributable to the skill of the parties in negotiating the OT. This can traced back to the need for more OT expertise in the government.

Risk avoidance appears to be an underlying factor that drives this consolidated major finding. Schooner (2002) notes it is hard to describe the procurement regime without acknowledging the role of risk avoidance. Avoiding undue risk is a fundamental responsibility of any governing body. But obsession with risk avoidance can suffocate creativity, stifle innovation, and make an institution ineffective. Here, the creativity and resources needed to

negotiate OTs may be required employees to take risks, something that many DoD employees are unwilling to do.

The prior OT literature points to other potential sources that may drive this consolidated major finding. For example, the demographics of the DoD workforce may be an underlying issue. The DBB (2015) found that DoD has an aging workforce that is inwardly focused. Inflexible employee salaries make it difficult to reward and incentivize the workforce. Thus, an aging and underpaid workforce may not be incentivized to dedicate the time and resources needed to learn something new such as OTs.

Moreover, there is not much policy for DoD employees to rely on when they are trying to negotiate an OT for the first time. Thus, there are few policy resources available to DoD employees. DoD only has one brief policy that addresses OTs (DOD(AT&L), 2016). So, there may be few institutional policy resources for DoD employees to refer to for learning about OTs. The lack of resources available to DoD employees to negotiate OTs may lead to risk aversion to negotiating an OT. This risk aversion may be a positive feedback mechanism that locks in the tendency for DoD organizations to continue to prefer to use traditional procurement agreements instead of OTs (Sumption, 1999; Schooner, 2002; Stevens, 2016; Dunn, 2017).

The historical institutionalism literature is relevant to this consolidated major finding. For instance, this consolidated major finding may show policy conversion. According to Beland and Powell (2016), policy conversion is a mechanism of policy change found in institutional settings with mutable policies. Here, policy conversion may occur because extant OT policy is non-binding, and so, mutable. Thus, the lack of OT policy may make what policy there is mutable, and thus subject to local change by the process of conversion.

Conversely, the lack of resources and creativity for negotiating OTs may also reinforce institutional stability and the preference for traditional procurement agreements. Greif (2004) theorizes that institutional actors will continue to follow customary practices based on limited knowledge, limited attention, and coordination costs. Institutionalized rules enable individuals to choose behavior for complicated situations. People are likely to rely on past rules of conduct to guide them and to continue following past patterns of self-enforcing behavior. Here, employees are likely to rely on established federal procurement rules of behavior rather than trying to try OTs, requiring more resources and creativity than they are used to using. Thus, traditional procurement processes may cause self-reinforcing behavior by DoD employees that perpetuates institutional stability at the expense of trying something new, OTs.

*Employees are used to relying on familiar procurement regulations and policies;
Employees are risk-averse to try new procurement processes such as OTs*

The eighth consolidated major finding under conceptual framework category 4 is: Employees are used to relying on familiar procurement regulations and policies. The ninth consolidated major finding under conceptual framework category 4 is: Employees are risk-averse to try new procurement processes such as OTs.

Consolidated major findings eight and nine are related in that consolidated major finding nine may cause consolidated major finding eight, and vice versa. Thus, interpretive discussion of these two major findings is combined. These consolidated major findings are like major finding 3(v) for conceptual framework category 3 (Lack of OT expertise discourages employees from trying OTs). The discussion for that consolidated major finding applies to these consolidated major findings. Additionally, several participants discussed the lack of familiarity

with OTs as a pervasive problem in the DoD procurement and program workforce. The following are examples of participant remarks under this theme.

Not only do we have a contracting workforce that isn't very deep in terms of their familiarity and their experience and expertise in using Other Transaction Agreements, but within the workforce that the OTA is going to be serving, they've never heard what an OTA is. All of those scientists and engineers who are the ones who are going to build the procurement packages for securing services to develop prototypes; most of them have never heard of an Other Transaction Agreement (OSD).

But my biggest bottleneck is the ability to have contracting officers help me who actually have a knowledge and know what they need to do. I mean, the main thing is I don't have enough contracting officers, but then of the ones that I have, they are not familiar with OTs (SCO).

Other participants characterized these findings in the broader context of DoD culture, discussing how a DoD culture of risk aversion stymies efforts to use OTs more widely. Here are examples of participant remarks under this theme.

We have to change that audit and risk culture around DoD procurement if we are going to effectively use OTs . . . Again, it is the risk culture, right? Because a lot of people don't . . . The contracting officers are incentivized not to take risks as opposed to take risks. So that defaults you into thinking in not an OT approach (DIUX).

I could see there being maybe a risk aversion to using an OT approach in the absence of a more robust guidance framework that could be relied upon by people to say, here are all the guidance on how we should be using OTs and how this particular one is exactly where an OT should perhaps be preferred. There is guidance from DPAP, and it even just recently updated [the] OT Guide. I think that's helpful, but still, there's not the same level of guidance. That's just the tip of the iceberg compared to the type of guidance and institutional support for letting a FAR contract (AFHQ).

These consolidated major findings are reflected in the OT literature. For example, the literature emphasizes that habituated dependence on traditional procurement agreements persists

despite the known advantages of OTs for procuring advanced technology solutions for national defense (Dunn, 2009, 2017; Stevens, 2016; GAO, 2016). There appears to be positive feedback mechanisms such as culturally reinforced risk aversion that has locked in the tendency for DoD organizations to continue to prefer to use traditional procurement agreements instead of OTs (Sumption, 1999; Schooner, 2002; Stevens, 2016; Dunn, 2017).

The historical institutionalism literature lends support to these consolidated major findings. For instance, the prior literature observes that passing time sediments established institutional arrangements in place by making it administratively or politically harder to switch to alternative institutional paths (Pierson, 2000; Schreyögg & Sydow, 2009). Here, employees may be locked into traditional procurement processes because these processes are sedimented in the institutional culture of DoD. Torfing (2009) discusses that path dependence is reinforced over time by positive feedback mechanisms, resulting in sedimentation of rules, norms, and values. He underscores understanding the historical dynamics that produce and reproduce these entrenched policy paths within institutions is critical to explaining why it is difficult to change policies once they are in place. Here, employees' risk aversion to try OTs in favor of relying on established procurement processes such as traditional procurement agreements may show this type of institutional inertia.

These consolidated major findings may also reflect what Schmidt (2008) refers to as employee background ideational abilities. Background ideational abilities make up the employee's understanding and compliance with established institutional processes and norms. By making sense of these processes and norms, and following them, employees contribute to maintaining the institutional stability. Here, employees' reliance on established

procurement processes lends to institutional stability—continued use of traditional procurement agreements.

Abeyasinghe (2012) suggests that socially constructed relationships between institutional actors may account for path dependence. Here, reliance on traditional procurement agreements and risk aversion to trying new processes may show the pervasive hierarchical institutional arrangements within DoD. For instance, relationships between DoD organizations and the Pentagon may act to institutionalize a culture of risk aversion, which has contributed to the sparse use of OTs compared to traditional procurement agreements.

For conceptual framework category 4, it is conceivable, however, that these are not the primary factors that explain the relative numbers of OTs compared to traditional procurement agreements. There may be other factors that are more critical to explaining the corresponding numbers of OTs versus traditional procurement agreements. For instance, OTs are not part of DoD Instruction (DoDI) 5000. DoDI 5000 is the major DoD policy process for managing the life cycle of most DoD programs, including program-related procurements (5000.02, 2017). OTs are not part of this significant DoD program policy, and so there is nowhere that a program manager can insert OTs into the program life cycle consistent with DoDI 5000. Chapter 7 discusses DoDI 5000 as part of the recommendations discussion.

There may also be fiscal limitations that impact the numbers of OTs. OTs are by nature normally limited to using R&D funding. As discussed in Chapter 1, most of the DoD budget comprises other categories of funding. Thus, most of the funding available to DoD organizations may not be proper to use for OTs. Although there is no specific definition of a prototype project in the OT statute, the law excludes most of what DoD buys—goods and services. OT projects are meant for prototype projects, generally meaning R&D work. Most of what DoD buys is not

R&D. Therefore, OTs take a backseat to traditional procurement agreements for most of what DoD organizations buy—goods and services.

Conceptual framework category 5: What can be changed

Interview Question 5 is used to collect data under conceptual framework category 5.

Interview Question 5 seeks to figure what participants believe are factors that could be changed to impact use of OTs. Participants discussed eight primary factors they believe could be changed to impact use of OTs. These consolidated major findings, as reflected in the consolidated major findings provided in Appendix HH, are:

- i. Organizational inertia, employee habit, and risk aversion impact use of OTs.
- ii. Leadership must actively and publicly support OTs.
- iii. More OT policy guidance, OT templates, and knowledge management tools will help employees use OTs.
- iv. Employees should be delegated more authority, and independence to use OTs.
- v. Employees should not suffer adverse career consequences just because an OT fails.
- vi. Adopting OT best practices from other federal agencies will help DoD to use OTs.
- vii. Providing training information to nontraditional contractors will make them more willing to use OTs.
- viii. Providing more resources to DoD contracting agents will make them more willing to use OTs.

The following discussion provides added perspectives on these consolidated major findings using selected direct quotations from the participants and by considering the prior literature topics.

Organizational inertia, employee habit, and risk aversion impact use of OTs

The first consolidated major finding under conceptual framework category 5 is: Organizational inertia, employee habit, and risk aversion impact use of OTs. This consolidated major finding is like major finding (viii) for conceptual framework category 4 (Employees are used to relying on familiar procurement regulations and policies) and major finding (ix) for conceptual framework category 4 (Employees are risk-averse to try new procurement processes such as OTs). The discussion of those major findings applies to this consolidated major finding.

Additionally, participants discussed inertia and risk aversion as factors that could be changed to increase usage of OTs. The following quotes are examples of participant remarks under this theme.

The biggest [problem] is probably just organizational inertia in terms of what they do, and it's that I think people tend to want to essentially do what they've done. If people know how to award a FAR contract, they're going to want to continue to do that unless they have come compelling reason to do otherwise. I think there's a lot of inertia that probably predisposes units to just continuing to do what they've done in the past. I think there are ways to overcome that type of inertia. I think training, guidance (SCO).

Again, like I just said before that, I think it's that fear. It's just that simple fear of not understanding the when to use it and how to use it and where to draw the line. Where you have to stop negotiations and [DoD officials] . . . [Will] say everything's negotiable, but it's not really an absolute true statement (RSGS5).

It's just fear of the unknown, and a lot of was-it-invented-here type mentality (PEO-CBD).

Fear. Just like I mentioned, fear, it's always fear. We talk about it. There are articles about it. We hear about it on the news. Even the policymakers will occasionally talk about it. It's fear, right? I think all the PCOs in the agency out there would be willing to use things that are new and more flexible if there wasn't the fear of auditors and other people stalking around, punishing them for its use, or god forbid, something goes wrong (SPAWAR).

These factors are discussed in the OT literature. Fear, inertia, and risk aversion may cause habituated dependence on traditional procurement agreements. This seems to be a reasonable conclusion because traditional procurement agreements predominate, including for R&D projects, despite the known advantages of OTs for procuring advanced technology solutions for national defense (Dunn, 2009, 2017; Stevens, 2016; GAO, 2016).

There may also be positive feedback mechanisms such as culturally reinforced risk aversion that have locked in the tendency for DoD organizations to continue to prefer to use traditional procurement agreements instead of OTs (Sumption, 1999; Schooner, 2002; Stevens, 2016; Dunn, 2017). This consolidated major finding shows that the work habits of DoD employees may contribute to institutionalizing a preference for traditional procurement agreements.

The historical institutionalism literature bears upon this consolidated major finding. For instance, the research of Sarigil (2015) on habitual path dependence seems relevant. Sarigil argues that institutional actors' habits can explain path dependence in historical institutionalism. Sarigil finds a direct linkage between habits and institutions because institutional processes become embodied or internalized in individual institutional actors as habits. These institutionalized habits predispose institutional actors to think and act in specific ways,

reinforcing institutional stability. Here participant remarks about pervasive risk aversion, habit, and fear in the DoD procurement community evokes Saragil's findings on habit and historical institutionalism.

This consolidated major finding aligns with Abeysinghe's (2012) theory that institutional actors will continue to follow customary practices based on limited knowledge, limited attention and coordination costs. Institutionalized rules enable individuals to choose familiar patterns of behavior to address complicated situations. For instance, employees are likely to rely on past rules of conduct to guide them and to continue following past patterns of self-reinforcing behavior. Here, employees' fear of trying something new such as OTs may result from limited knowledge and limited time and attention to devote to learning about OTs. Thus, this consolidated major finding may be stated in different terms as employees have limited knowledge, limited attention, and high coordination costs that deter them from choosing an OT instead of a traditional procurement agreement.

This consolidated major finding reflects the continued relevance of Hay's (1998) critique that historical institutionalism lacks a logical connection between institutions and individual behavior. Hay suggests that individual behavior—including how norms, rules, and policies impact individual behavior—must be accounted for in the broader framework of institutional analysis if historical institutionalism is to be an integrated theory. Although later scholars such as Sarigil and Abeysinghe adequately respond to Hay's criticisms, this consolidated major finding suggests that the DoD procurement system, with its many norms rules and policies, continues to influence individual employee behavior to favor traditional procurement agreements. Thus, a complete institutional account of the DoD OT program must specifically include consideration of individual agency.

Leadership must actively and publicly support OTs

The second consolidated major finding under conceptual framework category 5 is: Leadership must actively and publicly support OTs. This consolidated major finding is like major finding (v) for conceptual framework category 4 (DoD leadership insufficiently supports OT). The discussion for that major finding applies to this consolidated major finding. Additionally, leadership was discussed as a theme in several of the major findings in Chapter 4 and Chapter 5. For this consolidated major finding, several of the participants stressed the need for change in the sense that there must be active leadership support for OTs. The following are sample quotations by participants under this theme.

The biggest thing is you have to have leadership cover (SCO).

Of course, change will only be realized if senior leadership is behind it. Success is possible when people are educated on the topic. The training tools must be in place and implemented for OTs to take flight because you don't know what you don't know (AFRL).

It's difficult, I think, for these organizations who don't have leadership who are used to or [have] knowledge of OTs to get them to say, okay. Because all of a sudden now, okay, we're going to start doing OTs. They don't understand them. I think there's some apprehension, I imagine. If the requirement or the push from the top is, well, let's start looking into this, but the acquisition leadership just is not familiar with them that it's difficult to embrace. There are no defined guidelines for OTs. There's the OT Guide, and that is all that exists (LF2).

I think something (sic) that's coming down from DoD leadership about the visibility and endorsing the use of OTs would be really helpful (DARPA4).

The need for additional leadership in the DoD OT program is reflected in the OT literature. For example, Sumption (1999) finds that cultural change is difficult and that lack of knowledge of the benefits of OTs leads to resistance to change. Sumption recommends that DoD leadership should be at the center of changing the institutional culture to increase use of OTs. She concludes that leadership at all levels of industry and DoD must support and focus on cultural changes needed to carry out OTs. Sumption's research appears to be consistent with what participants said to support this consolidated major finding; indeed, what participants said about leadership throughout the study. Chapter 7 discusses leadership support for OTs as part of the conclusions and recommendations sections.

More OT policy guidance, OT templates, and knowledge management tools will help employees use OTs

The third consolidated major finding under conceptual framework category 5 is: More OT policy guidance, OT templates, and knowledge management tools will help employees use OTs. This consolidated major finding is like major finding (vi) for conceptual framework category 4 (There is insufficient training and policy guidance for OTs). The discussion for that consolidated major finding also applies to this consolidated major finding. Lack of dedicated OT training available to all DoD employees was another theme that permeated the participant remarks in Chapters 4 and Chapter 5. The following is a sample of participant quotations for this consolidated major finding.

There is not sufficient DoD implementing guide, templates, training (OSD).

Or put out more, okay, this is sort of, you take it or leave it, type language. Maybe if we put more with industry, put out the templates somewhere and said, okay, here's the standard template (RSGS5).

Whatever policy, even if OTs are supposed to be used as an exception, there should be clear guidance when it should be used. There should be implementing templates that would help people to use it and use it when it should be used (OSD).

It would really behoove the DoD to set up maybe a website where we can have here's all the literature on OTs that's available. Here are some templates. Here are some best practices. There are other organizations who could be using OT authority, but are they using it in the spirit in which it was meant to in the law? I don't know because I don't know how often there are checks and balances that come back and say, okay, well, we have this authority (PIC).

Well, you know, we just don't happen to have a lot of contracting offices that have that capability. I'm like, yeah, I agree, but there's nothing stopping us from doing it if we're willing to invest in training programs. We didn't use to have the Special Forces who are as proficient at the missions that they are today, ten years ago (SCO).

Mandatory training, because that's the only way that we're going to force the workforce to understand that there's another tool [OTs] out there and although I believe because we got enough understanding and history, I believe that it should be made the default. It should be the general way of engaging U.S. industry in technology development. But it definitely has to start with mandatory training because the voluntary training is not going to work. Leadership has to recognize that this is a better way of doing business (SPAWAR).

Education. Robust training. We send folks to DAU courses to learn FAR-based acquisition; OTs and other non-FAR based tools should be included in our curriculum. All contracting methods need to be a part of workforce training, and it should begin at the onset of one's career, such as a brand-new GS-7 (LF5).

This consolidated major finding reflects the OT literature. Dunn (2009) is good example of the prior literature emphasis on the need for OT training for the DoD workforce. Dunn points to lack of training as part of the problem of why OTs are not more widely used. He concludes it possible for DoD to use OTs more widely, but personnel willing to use OTs must be unafraid to

do so. Dunn recommends that DoD employees must be provided with the legislative, regulatory tools, training, delegated authority and encouragement to use innovative contracting methods to meet DoD mission needs. Dunn's insights appeared to follow participant remarks supporting this consolidated major finding. The need for readily available OT training for the DoD workforce was a frequent theme in participant remarks and in the OT literature. Chapter 7 discusses training resources for the DoD workforce and contractors as part of the conclusions and recommendations sections.

Employees should be delegated more authority and independence to use OTs

The fourth consolidated major finding under conceptual framework category 5 is: Employees should be delegated more authority, and independence to use OTs. Participants felt that positive change could be made within the DoD program if employees were delegated greater authority and independence to use OTs. One factor that was driving this consolidated major finding is the need to trust agreements officers to use OTs responsibly.

So, if you're going to use an instrument like this, you have to trust the people that you're giving the authority to use it. If you don't then just skip it, right? So, it's not enough to just say we're giving PCOs in these agencies the authority, right? To do this have to give it to them and then accept all the good, but also accept the occasional goof, and there will be a goof, just make sure we learn from the goof. That's all (SPAWAR).

Another participant remarked about how the implementation of more policies and procedures is resulting in less independence for contracting officers. "I think currently there's a move to put more policies and procedures in place that I think is undermining the independence

of the contracting officers” (AFHQ). An additional participant gave a recent example of how lack of delegated authority for her organization resulted in impeding its ability to award OTs.

So, we only had [OT] authority for \$5 million, up to \$5 million, which was coming through WHS . . . (USD)AT&L has the authority . . . Was not given down to us . . . So, we actually went back to the DCMO and said, we need the authority for up to a \$250 million. So, we received that authority to do it . . . So, the authorities to be able to use them, perhaps these other organizations don't have that authority (DIUX).

Even where agreements officers have the authority to use OTs it does not mean that they are sufficiently trained to use OTs responsibly. A participant discussed that training must go hand-in-hand with delegated authority to use OTs.

Okay, well I need [OT] authority, so I know who I need to ask for it. But contracting officers . . . They're not trained . . . The next knee-jerk reaction is, well, I don't have authority to do that. So, then they don't go beyond to figure it out just because they don't know (DOTC).

This consolidated major finding reflects Schooner’s (1997, 2002) calls for DoD to move from rigid rules to guiding principles, that it should work to get bureaucracy out of the way, and that DoD should give managers more authority and accountability. It also follows Dunn’s (2017) recommendation that DoD employees must be provided with the legislative, regulatory tools, training, delegated authority and encouragement to use innovative contracting methods to meet DoD mission needs.

This consolidated major finding also follows the historical institutionalism literature. For example, Greif (2004) proposes quasi-parameters. A quasi-parameter is an institutional parameter that is endogenously determined and thus variable in the long term. The institutional

process for how DoD organizations are delegated OT authority may be a good example of a quasi-parameter.

This consolidated major finding may show underlying political power struggles between DoD actors. For instance, the Pentagon may be reluctant to delegate greater OT authority to DoD field organizations out of fear that these organizations will misuse the authority. Supporting this idea, Peters (2005) critiques path dependency scholarship by arguing that path dependency may mask conflicts between political actors under the surface of the outwardly stable organizational structure. Peters suggests that focusing on the actions of political actors can help address this problem. Thus, for this consolidated major finding, the stable DoD OT program may mask conflict between political actors, for instance, the Pentagon and DoD field organizations, which has resulted in less OT authority being delegated to DoD field organizations than necessary to increase overall use of OTs.

Similarly, Panizza (2013) discusses that power relationships between institutional actors are essential in analyzing the potential for policy change. Panizza's emphasis on power relationships between institutional actors applies to this consolidated major finding. DoD is a hierarchal institution with power relationships defined between DoD organization and between individual employees within DoD organizations. These power relationships may cause DoD employees being delegated insufficient authority and independence to use OTs effectively. In turn, this may impede the wider use of OTs in DoD.

This consolidated major finding evokes Kuipers' (2009) study of organizational decline. Kuipers identifies three mechanisms that can contribute organizational decline. First, some groups of institutional actors are stronger than others, enabling them to lock in positions of authority and influence. Second, efficiency mechanisms that at first give an organization a

comparative advantage over other organizations can, over time, crowd out new ideas and ways of doing business. Third, legitimacy mechanisms can account for an organization becoming self-inflated with its own importance, leading to institutional hubris and eventual decline. Here, the relative lack of delegated OT authority and independence discussed by participants may reflect Kuiper's decline mechanisms holding back the DoD OT program. Thus, this consolidated major finding may be an indicator of organizational decline within the DoD OT program, if not the entire DoD procurement system. Chapter 7 discusses additional delegated OT authority for DoD employees as part of the conclusions and recommendations sections.

Employees should not suffer adverse career consequences just because an OT fails

The fifth consolidated major finding under conceptual framework category 5 is: Employees should not suffer adverse career consequences just because an OT fails. This consolidated major finding is like major finding (vi) for conceptual framework category 3 (There is insufficient training and policy guidance for OTs). The discussion for that consolidated major finding applies to this consolidated major finding.

Additionally, DoD is a hierarchical organization, and earlier chapters have discussed how the institution is prone to punishing failure. There is an active internal audit system in DoD, implemented by organizations such as the DCAA, the DoD IG, and the GAO that oversee DoD organizations. With this institutional culture as a backdrop, participants talked about fear of failure as something that could be changed to result in the wider use of OTs. The following is a sample of participant quotations under this theme.

And something will go wrong; it just happens. It's business and turning around and then punishing everybody for it. Writing policies that start making all kinds of reviews, right? We did that when the Future Combat Systems (SOCOM).

We punish the entire DoD for one mistake. I don't think that's the way to respond, right? Up training, figure out how to better communicate the rights and the wrongs. Maybe more monitoring of programs, but why do we then have to inflict on ourselves more levels of bureaucracy (SPAWAR)?

Other participants, however, reflected on R&D projects, how they are prone to failure and that failure should be accepted as part of conducting OTs. Contracting officers that cannot effectively negotiate OTs should not suffer adverse career consequences, but instead not be allowed to continue to work in the OT field. Here are sample participant quotes under this theme.

But the successes [of OTs] are great, and it makes all the other strings you pulled that don't lead anywhere certainly worth it. Besides, you're learning every time you do one of those it fails, right? (SPAWAR).

But there's just a lot of failure when you do S&T, right? You're trying to pull a string on things that don't currently exist not everyone's going to be a home run, but you have to try them, all right. Otherwise, you won't find the next Internet, so to speak (SPAWAR).

I think people should be allowed to fail. And then if it's a small amount of cost, you weed out your failures pretty fast. You even weed out those who are not capable of creating good deals. So, the contracting officers don't ever get replaced, so they'll ride out the program for as long as they're there. There's no such thing as firing contracting officers. You've got a bad contracting officer; they're there for life. But the paradigm maybe should be that someone's not good for the job, then you lose [OT] authority, you go back to [traditional] contracts (DARPA2).

This consolidated major finding reflects the OT literature, for example, White House policy. In 2016, a White House committee published the U.S. national science, technology, and

engineering strategy (White House, 2016). The strategy calls for modernizing government to help in adopting innovative practices from the private sector. The strategy recommends more use of prototyping to spur national innovation. Here, modernizing the DoD procurement system might include adopting innovative methods such as OTs and not punishing employees when an OT fails.

This consolidated major finding reflects other parts of the prior literature, for example, the literature discussing positive feedback mechanisms (Greif & Laitin, 2004; GAO-16-209, 2016). The OT literature implies that cultural factors such as punishing failure and an institutional emphasis on auditing and inspections are positive feedback mechanisms that influence DoD employees to continue to choose traditional procurement agreements instead of OTs (Dunn, 2009, 2017).

Dunn (2017) provides relevant insights related to this consolidated major finding. Dunn argues that DoD must accommodate failure as part of innovative contracting methods. Dunn recommends that DoD employees must be provided with the legislative, regulatory tools, training, delegated authority, and encouragement to use innovative contracting approaches to meet DoD mission needs. Thus, Dunn's insights and policy recommendations are well aligned with this consolidated major finding.

Adopting OT best practices from other federal agencies will help DoD to use OTs

The sixth consolidated major finding under conceptual framework category 5 is:
Adopting OT best practices from other federal agencies will help DoD to use OTs. Several

participants supported this consolidated his major finding. The following is a sample of participant quotations.

I think if we could put some information out there about the different, give some examples about what different department agencies have done through the OT agreements, you know, success stories so to speak, I think that would be helpful to getting maybe a wider adoption of OTs, as sort of another tool in the toolbox that you don't have to be afraid of means it's not a sharp knife here. Maybe more like a butter knife (DARPA4).

If other DoD organizations could adopt this kind of same open-mindedness and lack of fear of OTs, then that would go a long way in making them successful (PIC).
If there's this belief out there that OTs can in some ways speed that up, more agencies may embrace it, but they may find out it's a little bit more challenging than that (LF2).

One participant talked about how he tried to speed up the award process for OTs that his organization by using procedures from the DHS SVIP.

How do we shrink the [OT] timeline from idea to award? My decision that OTs are one of the ways that maybe can help us get there because of the flexibility afforded to us and how we do our analysis. I think we're not opposed to also other OT usages. For example, this DHS SVIP approach is unique, because they actually have proposers come in and do essentially a live pitch, and the decision is pretty much made on the spot which is unique. It's not so much the very formal, here's my proposal. I think they present some document. There are, I think, multiple phases to the selection, but ultimately it comes in, and they do this Shark Tank approach (LF2).

This consolidated major finding has support in the OT literature. For example, in 2016, the GAO conducted a government-wide survey of the federal agency use of OTs (GAO-16-209, 2016). The survey covers OTs awarded by federal agencies during fiscal years 2010-2014. The GAO finds that most agencies use OT sparingly and that ten of eleven agencies reported that OTs are used in less than 5% of overall procurements. DoD reported it uses OTs about 10% as

much as traditional procurement contracts. But the GAO finds that OTs enable federal agencies to enter into agreements with commercial partners that would not otherwise be possible under traditional procurement mechanisms. The low numbers of OTs across the federal government implies that wider use could be achieved if agency shared information with each other about OT best practices.

Halchin (2011) provides policy options for the federal OT program, including establishing a government website where agencies would publicize OT opportunities and give information about established OTs (Halchin, 2011, pp. 39-40)). Such a site would help agencies to share OT best practices with each other consistent with this consolidated major finding. Chapter 7 discusses sharing OT best practices with other federal agencies as part of the conclusions and recommendations sections.

Providing training information to nontraditional contractors will make them more willing to use OTs

The seventh major finding under conceptual framework category 5 is: Providing training information to nontraditional contractors will make them more willing to use OTs. Besides discussing the need for more OT training for DoD personnel, participants added that similar OT training should be provided for nontraditional contractors. One participant, for example, explained this as the need for “education on both sides” (NAVYHQ). Another participant linked education to institutional culture: “It is culture. It is education. Obviously, training falls under education” (LF2). Still another participant linked the need for OT education to the lack of basic awareness of OTs.

Obviously, better education. It's not even just education. It's awareness. And we live in the world, so we think it's everywhere, and everybody's talking about it, but, I mean, there are still so many people we stumble upon that say, man, I wish I would have known about this [OTs]. So just awareness (DTRA).

A DARPA participant discussed how contractors might be resistant to using OTs because of their lack of OT education.

I also mentioned resistance [to OTs] on the side of companies, knowing that this is a very rigorous process to go through . . . I don't know if it's education, but I don't know how you educate the community at large to say, look, these aren't terrible contracts. There's a lot of room for negotiation . . . I just know the people that got on OTAs in our case were both mid-size companies and they seemed fine with the negotiations process (LF1).

Contractor participants discussed the need for OT training. The following are sample contractor participant remarks under in this theme:

I also mentioned resistance on the side of companies, knowing that this [OTs] is a very rigorous process to go through. I don't, again, I don't know if it's education, but I don't know how you educate the community at large to say, look, these aren't terrible contracts. There's a lot of room for negotiation. That's what these are about. It's coming to a good point for both the government and the performer. I don't know how much of that outreach is set, because a lot of times people see an announcement that says, I want, once again, 50 widgets by next Thursday. If they see . . . If they think they're going to be under an OTA, maybe they don't even apply [for an OT funding opportunity]. If they did apply, then they would realize it's not as malicious as they think it is (LF4).

From a small company standpoint, just . . . Understanding . . . Like, if I Google-search OT versus FAR and start trying to learn about it myself, it gets overwhelming . . . Imagine there being, kind of a [OT] cheat sheet . . . Or a small white paper showing the difference between an OT and a FAR [contract] . . . Maybe, pluses and minuses . . . The differences between OT and FAR [contract] and why one might pick one versus the other . . . For a small company that probably doesn't have internal counsel and is using . . . External counsel as little as possible because of cost. Getting that kind of help about what the difference is and why we might want to choose one versus the other could be helpful (LF5).

The OT literature does not discuss providing OT training to nontraditional contractors. But Stevens (2016) identifies challenges remaining in using OTs, including culture, training for OT officials, lack of OT expertise in the federal government and no advertising platform where contractors can find OT opportunities. OT officials could include those on the contractor side of the negotiation.

The historical institutionalism literature does not discuss providing procurement-related training to contractors. Coombs (1998), however, considers that path dependency centers on positive returns, meaning positive returns as explained in the economic literature about technological dependencies. KMPs create path dependency by doing things in a particular way that predisposes an organization to do it that way in the future. Here, a KMP could be started by providing OT training to contractors, including nontraditional contractors. This might help establish a KMP that would make nontraditional contractors more familiar with OTs, hence making them more likely to apply for future DoD OT funding opportunities.

Sorensen (2015) sees institutional actors as a locus of endogenous change. He contrasts two standard institutional characteristics to figure whether a change will occur: Do defenders of the status quo have strong or weak change possibilities; and whether the institutional system offers actors opportunities for discretion, implementation, or enforcement. Here, providing OT contractors with OT training and information might lead to more contractors applying for DoD OT funding opportunities. This could influence the institutional system—the DoD program—by giving agreements officers and program manager more experience with OTs, leading to wider use of OTs by DoD.

Kickert (2011) and Blyth (2016) find that most organizational change is gradual but can accumulate and cause a significant change. These scholars discuss five endogenous change

mechanisms: layering, displacement, drift, conversion, and exhaustion. Here, providing OT training to nontraditional contractors may be an example of layering or conversion in action. Absent DoD policy direction, it may lead to policy drift. Chapter 7 discusses making OT training resources available to contractors as part of the conclusions and recommendations sections.

Providing more resources to DoD contracting agents will make them more willing to use OTs

The eighth consolidated major finding under conceptual framework category 5 is: Providing more resources to DoD contracting agents will make them more willing to use OTs. Participants discussed that contracting agents should be provided with additional resources to help them negotiate and administer OTs. Some small DoD organizations such as DARPA and DIUx rely on contracting agents to administer their OTs. But contracting agents, much like the rest of DoD, require additional training and education about OTs. As one participant noted, “We’ve got to do a better job at educating and communicating to the community on the advantages, the disadvantages, the how-to, and when” (AFRL). A DARPA participant discussed that contracting agents should be provided more resources because of the higher negotiation workload associated with OTs compared to traditional procurement agreements:

There is a greater workload associated with these [OT] contracts. But to ensure that there are the resources to support those activities, I think would be helpful. Sometimes I sense when I’m talking with the [contracting] agents that they can be overwhelmed by too many of these [OTs]. Just because of workload. Giving people the training, or other support that they need, so it’s not so daunting . . . And I think understanding the impact of them, right? . . . If you can understand why somebody may want to go down this [OT] path. And how it can lead to greatest impact [on DoD] overall, I think people can get behind that (LF3).

Another participant discussed the need for his organization to find skilled contracting agents to help with negotiating and administering OTs.

If we can understand what some of the success of these are, I think that [would] probably [be] really helpful to the Agency. And then helping to understand who those contracting agents are, who are skilled at doing OTs. It's my understanding that not everybody can do OTs, or can do them well, at least (LF1).

The prior OT literature reflects this consolidated major finding. For instance, the literature documents that the size of the federal contracting workforce has not kept pace with the growth in acquisition workload. Kelman and Schooner (2009) note that acquisition workload has increased over 140% during the first decade of the new century. Here, contracting agent workload may be a factor that deters agents from taking on more OTs for other DoD organizations.

Lack of DoD OT policy may be another contributing factor to this consolidated major finding. DoD only has one policy issuance that directly addresses OTs (DOD(AT&L), 2016). This two-page document responds to the 2016 congressional amendments to OT statute and requires Pentagon approval before awarding high dollar value OTs. The brevity of this policy reflects the overall lack of DoD policy on OTs and thus may help explain why DoD does not more widely use OTs. For instance, where there may be insufficient institutional policy resources for contracting agents to learn about OTs.

The historical institutionalism literature supports this consolidated major finding. For instance, the lack of contracting agent resources may represent a positive feedback mechanism that contributes to continued reliance on traditional procurement agreements. Positive feedback mechanisms, however, can also be a source of endogenous institutional change. Jacobs (2015)

theorizes that positive feedback mechanisms to reinforce path dependence can cause policy change. If path dependent policies are perceived to be not working, institutional actors become more likely to undertake the search for a new alternative to address these problems. Here, participant remarks supporting this consolidated major finding show they are looking for ways to change what they perceive is not working—contracting agents that are unable or unwilling to help their organization with OTs.

For conceptual framework category 5, it is conceivable, however, that these are not the primary factors that could be changed to result in the broader use of OTs by DoD. There may be other factors that are more critical change factors than those identified by the participants. For instance, the prior OT literature discusses institutional change factors not addressed by the participants. Bloch (2002), for example, concludes that OTs attract more traditional contractors than nontraditional contractors. This suggests that DoD may need to change its OT policies to attract more contractors that are nontraditional. Participants did not discuss this factor. Stevens (2016) recommends that DoD develop a dedicated OT writing software program that could aid agreements officers to generate OTs. Thus, the prior OT literature suggests potential institutional change factors that were not discussed by the participants, but that could be valuable in effecting change that might lead to broader use of OTs by DoD.

Synthesis of the Consolidated Major Findings

Following interpretation, the researcher synthesized the consolidated major findings. The synthesis discussion below uses the concepts of historical institutionalism as a theoretical lens and discussion framework. The purpose of this approach is to consider whether the concepts of

historical institutionalism apply to the consolidated major findings, and, by inference, to the DoD OT program. This also enables the researcher to consider whether the concepts of historical institutionalism offer insights on the research hypothesis. Thus, the first section of the synthesis discussion below discusses the consolidated major findings using historical institutionalism concepts and the researcher's perspectives. The study's initial assumptions are revisited in the second section of the synthesis discussion to consider what has been learned from the study.

An important distinction between the interpretation and synthesis discussions is that the latter includes the researcher's perspectives, while the former includes direct quotations from the participant interviews. This approach is taken because synthesis involves reflecting on the research hypothesis, and the researcher determines that his perspectives might be useful in that regard. For interpretation, the researcher believes that direct quotations from the participant interviews are most useful in aiding the interpretive discussion. The researcher believes this approach to interpretation and synthesis helps minimize researcher bias by leaving the researcher's perspectives to synthesis, namely, until after analysis and interpretation of the data was completed.

For synthesis, using the consolidated major findings, the researcher tries to assess if the concepts of historical institutionalism—for instance, path dependence and endogenous change—apply to the DoD OT program. The study does not assume that the DoD OT program reflects the concepts of historical institutionalism. Instead, the study approached data collection and analysis with no preconceived determination whether this prior literature topic applies to the DoD OT program. Now, with the study findings presented in Chapter 4 and Chapter 5, and with the consolidated major findings from this chapter in hand, the researcher is better situated to assess the concepts of the historical institutionalism and their relevance to the DoD OT program.

As discussed in Chapter 2, historical institutionalism has been used to analyze the institutional dynamics of U.S. federal policy systems (Broschek, 2013). Chapter 2 summarizes how Zehavi (2012) explores the relevance of historical institutionalism in small policy domains. Zehavi notes that most studies using historical institutionalism focus on national-level institutions but finds it can be applied to subnational domains. The study focuses on a subnational part of a U.S. federal policy system, the DoD OT program. Thus, the researcher believes historical institutionalism is a suitable theoretical lens for studying the DoD OT program. Given the consolidated major findings and interpretation that has been provided in this chapter, the discussion below can now consider the relevance of historical institutionalism to the study.

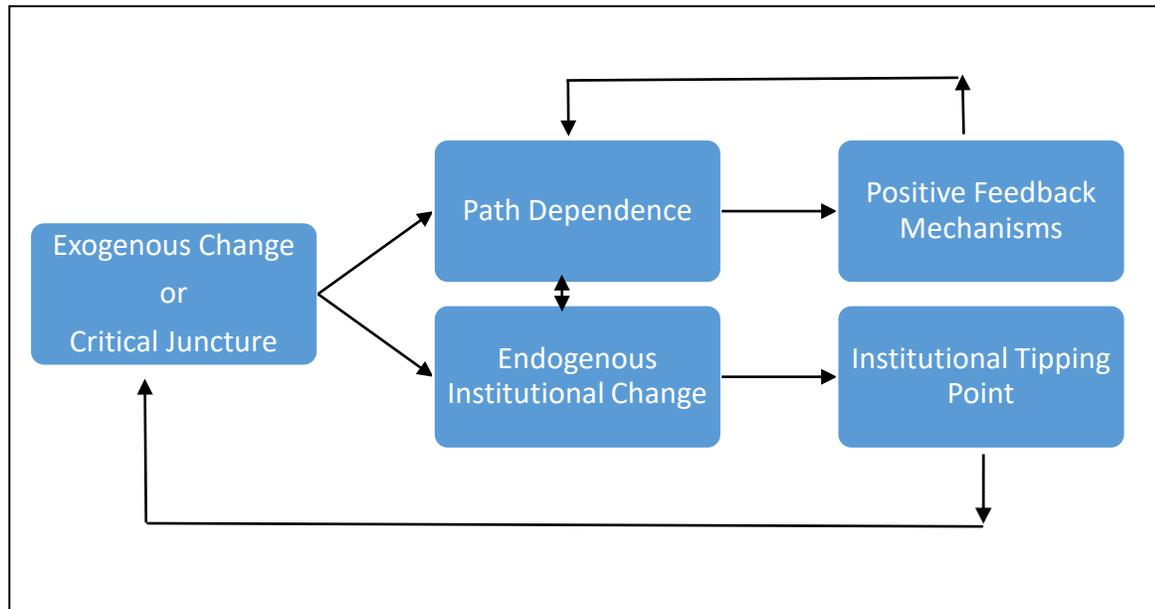
The concepts of historical institutionalism, in tandem with the consolidated major findings and interpretation from this chapter, are used to help unpack the study's research hypothesis and assess whether historical institutionalism is a useful theoretical lens for the study. The research hypothesis is:

Although Congress has amended the OT statute to encourage wider use OTs, DoD has continued to use OTs sparingly. Based on the researcher's professional experience, institutional resistance to using OTs can be traced to path dependence and positive feedback mechanisms such as low leadership support and employee risk aversion and habit. The numbers and variety of OTs at some DoD organization, however, show that institutional change is occurring, and this may lead to a critical juncture or policy tipping point, resulting in wider use of OTs across DoD.

As discussed below, several historical institutionalism concepts—for instance, path dependence and endogenous institutional change—are implicated by the research hypothesis. The second part of the synthesis discussion below revisits the study's initial assumptions. Revisiting the initial assumptions helps the interpretive process by requiring the researcher to go back and reflect on the assumptions in view of data collected during the study. It also helped the researcher to consider what is learned in the study.

Chapter 2 provided Figure 3, showing the temporal relationships of historical institutionalism concepts. Figure 3 is reproduced below. The synthesis discussion that follows summarizes relevant prior historical institutionalism literature from Chapter 2. For each concept of historical institutionalism, the synthesis discussion considers how the concept applies to the DoD OT program. The research hypothesis is revisited as part of the discussion. The synthesis discussion concludes by determining whether to reject or not reject the research hypothesis. As mentioned, the study does not use quantitative methods, including it does not formally test the study's research hypothesis. But based on synthesis of the study's consolidated major findings, the researcher believes it reasonable to reject or not reject the research hypothesis based on these findings and research methods. Therefore, the synthesis summary section determines whether to reject or not reject the research hypothesis.

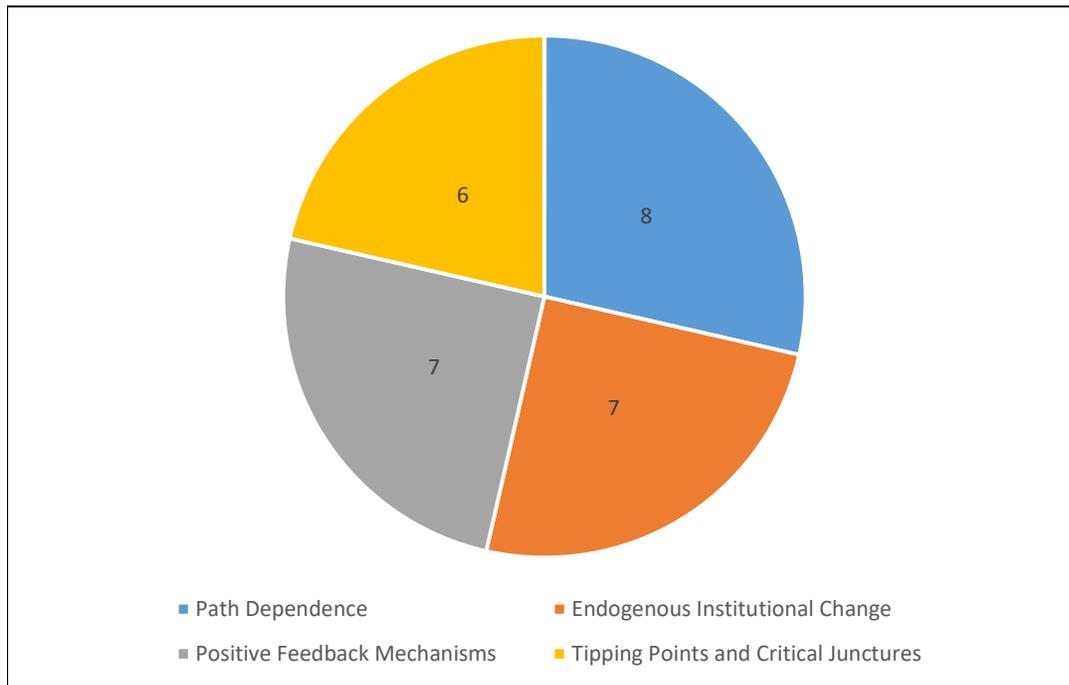
Figure 16. Temporal Relationships of Historical Institutionalism Concepts



Source: Author.

The synthesis discussion that follows draws on the historical institutionalism literature review from Chapter 2 and includes the researcher's perspectives for 28 of the 32 consolidated major findings. As mentioned, the researcher's perspectives for the other four consolidated major findings are included in the preceding interpretation discussion. To organize the synthesis discussion, and to give a more holistic understanding of the study data, the consolidated major findings are grouped according to their corresponding concept of historical institutionalism. The following Figure illustrates the results of sorting 28 the consolidated major findings by historical institutionalism concept.

Figure 17. Numbers of Consolidated Major Findings by Historical Institutionalism Concept



Source: Author.

Note: Four of the consolidated major findings are not discussed in the synthesis section. They are discussed in the preceding interpretation section.

To further organize the consolidated major findings, the researcher also sorts them by theme. A theme is a group of consolidated major findings that are similar in a relevant dimension across the findings. Themes are derived from the prior literature and a logical grouping of the findings. For example, for the historical institutionalism concept of path dependence, the researcher sorted the related consolidated major findings into three themes. These three themes are: Employees, training and resources, and OT disadvantages. These themes frequently occur across these consolidated major findings.

So, the themes are used to group similar consolidated major findings. For example, the employees theme includes a major finding from conceptual framework category 3 (OT Disadvantages): Some employees resist change (OTs) because they fear losing control of

procurement processes and turf. The researcher believes this consolidated major finding points to potential sources of path dependence on traditional procurement processes—for instance, FAR and DFARS—in the DoD OT program. The same process is used to derive and group all other themes with consolidated major findings.

Therefore, the synthesis discussion is organized by historical institutionalism concept. The discussion of each concept of historical institutionalism is broken out by theme, and under each theme, a group of related consolidated major findings are discussed. Each concept of historical institutionalism discussed below is introduced by a table that shows the themes and corresponding consolidated major findings related to the concept. The table is meant to orient the reader to what consolidated major findings support each historical institutionalism concept and how these findings are logically grouped by themes. As mentioned, the synthesis discussion draws on the prior historical institutionalism literature and includes the researcher's professional perspectives.

Path dependence

Figure 16 illustrates that path dependence is a concept of historical institutionalism. The literature review in Chapter 2 discusses that path dependence explains that established institutions are difficult to change because early-established institutional processes become locked in, and so small choices early on can have enduring institutional impacts (Sorensen, 2015). Each step along an established institutional pathway makes the costs of institutional change higher. Thus, passaging time sediments established institutional arrangements in place

by making it administratively or politically harder to switch to alternative institutional paths (Pierson, 2000; Schreyögg & Sydow, 2009).

The temporal dimension of institutional development is a critical aspect of path dependence. Pierson (2000) argues that institutions must be understood as processes that unfold over time, and that path dependence makes it hard for institutional actors to deviate from these processes. Pierson's central claim is that path dependence is a useful framework for developing the key claim of historical institutionalism; that patterns and the timing of historical events matter—meaning big institutional consequences can result from small institutional starting points. According to Pierson, large institutions often have concentrated hierarchical power structures that exacerbate power asymmetries. Weak institutional learning processes and the short time horizons of politicians intensifies path dependence in large institutions. These limitations make it difficult for institutional actors to deviate from established path-dependent processes.

Torring (2009) discusses that path dependence—what he calls institutional inertia—is reinforced over time by positive feedback mechanisms, resulting in sedimentation of rules, norms, and values. Torring underscores that understanding the historical dynamics that produce and reproduce these entrenched policy paths within institutions is important to explaining why policies are difficult to change once they are in place.

For synthesis, several consolidated major findings appear to support these prior literature teachings about the concept of path dependence and how they apply to the DoD OT program. To aid the synthesis discussion that follows, the relevant consolidated major findings are organized and discussed under three themes: Employees, training and resources, and OT disadvantages.

The following Table summarizes the consolidated major findings corresponding to the historical institutionalism concept of path dependence, as organized under these three themes.

Table 32. Path Dependence: Corresponding Consolidated Major Findings

Theme	Consolidated Major Findings and Conceptual Framework Category (CFC) Finding Numbers*
Employees	<ul style="list-style-type: none"> • Some employees resist change (OTs) because they fear losing control of procurement processes and turf (CFC 3-i) • Employees are used to relying on familiar procurement regulations and policies (CFC 4-viii) • Organizational inertia, employee habit, and risk aversion impact use of OTs (CFC 5-i)
Training and resources	<ul style="list-style-type: none"> • Lack of OT expertise discourages employees from trying OTs (CFC 3-v) • The resources and creativity needed to negotiate OTs cause more TPAs (CFC 4-vii) • There is insufficient training and policy guidance for OTs (CFC 4-vi)
OT disadvantages	<ul style="list-style-type: none"> • OTs take longer to negotiate than TPAs because most terms are negotiable (CFC 3-iii) • Changes during an OT are time-consuming (CFC 3-iv)

Source: Author.

* CFC finding numbers are from Appendix HH.

Employees

The first theme—employees—is used to group employee-related consolidated major findings that may show path dependence in the DoD OT program. For example, a consolidated major finding under conceptual framework category 3 (OT Disadvantages) is: Some employees

resist change (OTs) because they fear losing control of procurement processes and turf. DoD has a hierarchical power structure that institutionalizes authority boundaries. From the researcher's perspective, procurement employees may view OTs as a threat to their authority and to administrative safeguards built into traditional procurement agreements that have taken decades to establish. Seeing OTs as a control and turf threat to these administrative safeguards may act to reinforce path dependence on traditional procurement agreements.

A consolidated major finding under conceptual framework category 4 (Numbers of OTs Versus TPAs) is: Employees are used to relying on familiar procurement regulations and policies. From the researcher's perspective, most DoD contracting employees are trained from early in their careers to use traditional procurement agreements. They are not trained to use OTs. There is a wealth of DoD training resources for traditional procurement agreements. There is not a similar depth of training available for OTs. Thus, the factors that account for employee familiarity with OTs may reinforce path dependence on traditional procurement agreements.

A similar consolidated major finding under conceptual framework category 5 (What can be Changed) is: Organizational inertia, employee habit, and risk aversion impact use of OTs. Employees have been relying on traditional procurement agreements since at least the mid-1990s. There is not much incentive for a busy contracting officer or program manager to take the risk of using an OT. Often, there are negative career incentives for using OTs. Moreover, there does not appear to be much support from coworkers to use OTs because most of them also lack training on how to negotiate and administer OTs. These employee-related factors may reinforce path dependence on traditional procurement agreements.

Training and resources

The second theme—training and resources—is used to group training and resources related consolidated major finding that may show path dependence in the DoD OT program. For instance, a consolidated major finding under conceptual framework category 3 (OT Disadvantages Versus TPAs) is: Lack of OT expertise discourages employees from trying OTs. From the researcher’s perspective, employees are hesitant to try new procurement processes because they might fail. Failure is sometimes punished, for instance, employees involved in the failure are not promoted or receive downgraded performance appraisals. Lack of familiarity with OTs means that employees face a steep learning curve to try their first OT, which suggests it will take a long time to negotiate the OT. Many employees believe they do not have time to become familiar with OTs. These factors may amplify path dependence on traditional procurement agreements.

A related consolidated major finding under conceptual framework category 4 (Numbers of OTs Versus TPAs) is: The resources and creativity needed to negotiate OTs cause more TPAs. From the researcher’s perspective, contracting officers find it easier to print out a traditional procurement agreement from an automatic contract writing system such as SPS/PD2 than to start with a blank sheet of paper to negotiate an OT from scratch. It seems commonsense that it is difficult for people that have never negotiated an OT to dedicate the time and resources to try something new like an OT.

OTs are synonymous with advanced technology. These types of projects often raise unique negotiation and administration issues, for instance, about government property, intellectual property, and technical milestone payments. These unique issues can challenge

inexperienced employees. So, the advanced technologies nature of OTs may contribute to path dependence on traditional procurement agreements.

Another consolidated major finding under conceptual framework category 4 is: There is insufficient training and policy guidance for OTs. From the researcher's perspective, DoD organizations may not have the time or resources to engage in the training necessary to educate the DoD workforce to a level that will impact wider use of OTs. Military organizations such as the Marine Corps do not focus on R&D to carry out their mission. The Marine Corps and other combat organizations may not believe it worth the expense to train their workforce on OTs, which they may see as a niche type of agreement meant only for R&D organizations.

OTs themselves may be part of the problem. OTs are unfettered from the rules and regulations that pertain to traditional procurement agreements. This freedom implicates that there is not a great deal of training or other mandatory processes associated with awarding and administering these types of agreements. So, the unrestricted nature of OT themselves may be a barrier to providing the necessary training and resources for more widely use them. These training and resources related factors may reinforce path dependence on traditional procurement agreements.

OT disadvantages

The third theme—OT disadvantages—is used to group OT disadvantages related consolidated major findings that may how path dependence in the DoD OT program. For example, a consolidated major finding under conceptual framework category 3 (OT Disadvantages Versus TPAs) is: OTs take longer to negotiate than TPAs because most terms are

negotiable. From the researcher's perspective, OTs are, by design, meant for developing advanced technologies. It can be time-consuming to negotiate and administer agreements for developing advanced technologies. OT projects often involve technical and costs risks that are hard to define during negotiation. This can increase the time to negotiate terms and conditions to divide these risks between the parties.

Another consolidated major finding under conceptual framework category 3 is: Changes during an OT are time-consuming. From the researcher's perspective, the OT agreement payment structure is customized to the OT project. Again, the terms and conditions to cover payment have to be negotiated and tailored to match the needs of the particular technology at issue, which takes time. Thus, because OTs are for developing advanced technologies—often technology never developed before—it can take longer to negotiate the terms and conditions, and to make changes during such agreements than it does for traditional procurement agreements. These OT disadvantages related factors might increase path dependence on traditional procurement agreements.

Thus, several consolidated major findings show path dependence in the DoD OT program. But the research hypothesis postulates that endogenous institutional change is occurring at the same time in the DoD OT program. The prior literature teaches that the institutional path dependence is not necessarily exclusive of endogenous institutional change occurring in the institution (Greif, 2004; Howlett, 2009; Kickert & Van der Meer, 2011; Blyth, 2016). So, although the major findings discussed above are consistent with the concept of path dependence, it does not rule out that endogenous institutional change may also be occurring in the DoD OT program. Therefore, the consolidated major findings discussed above are not inconsistent with the research hypothesis.

Endogenous institutional change

Figure 16 illustrates that endogenous institutional change is a concept of historical institutionalism. The literature review in Chapter 2 discusses Sorensen's (2015) overview of endogenous institutional change scholarship. Sorensen notes that recent historical institutional research has focused on identifying and explaining endogenous institutional change mechanisms that can account for gradual institutional change. Contrary to traditional punctuated equilibrium theory, most institutional change is gradual and incremental. Incremental change transforms institutions over an extended period compared to periods associated with critical junctures. Thus, according to Sorensen, the standard state of an institution is one of stability or constrained adaptive change.

Similar to Sorensen's research, Kickert (2011) posits that most organizational change is gradual, but that small changes can accumulate and cause a significant change. Although historical institutionalism focuses on path dependency, Kickert emphasizes that historical institutionalism is congruent with the idea that organizations can gradually change. Kickert identifies five endogenous change mechanisms: layering, displacement, drift, conversion, and exhaustion. He concludes that historical institutionalism provides a useful theoretical framework for studying the small, slow, gradual change typically found in most organizations.

For synthesis, several consolidated major findings appear to show that the concept of endogenous institutional change applies to the DoD OT program. To aid the synthesis discussion that follows, the relevant consolidated major findings are organized and discussed under three themes: DoD organizations, OT terms and conditions, and OT advantages. The

following Table summarizes the consolidated major findings corresponding to the historical institutionalism concept of endogenous institutional change, as organized under these three themes.

Table 33. Endogenous Institutional Change: Corresponding Consolidated Major Findings

Theme	Consolidated Major Findings and Conceptual Framework Category (CFC) Finding Numbers*
DoD organizations	<ul style="list-style-type: none"> • DoD organizations select OTs instead of TPAs to help field advanced technology capabilities and to work with nontraditional contractors (CFC 1-i) • OTs impact the ability of organizations to attract advanced technology contractors, enabling new technology solutions for mission needs (CFC 2-iv)
OT terms and conditions	<ul style="list-style-type: none"> • OTs offer flexible terms and conditions, for instance, the government can accept funding from the contractor (CFC 1-ii) • OTs offer simpler and more flexible terms and conditions than TPAs, for instance, changing an OT is easier, and the government can accept funding and in-kind contributions from the OT contractor (CFC 2-i) • Fewer rules and regulations apply to OT than TPAs (CFC 2-ii)
OT advantages	<ul style="list-style-type: none"> • OTs improve communication and collaboration between the parties (CFC 2-ii) • OT advantages such as speed to award impacts the numbers of OTs (CFC 4-ii)

Source: Author.

* CFC finding numbers are from Appendix HH.

DoD organizations

The first theme—DoD organizations—is used to group DoD organization related consolidated major findings that show that endogenous institutional change is occurring in the DoD OT program. For example, a consolidated major finding under conceptual framework category 1 (OT Award) is: DoD organizations select OTs instead of TPAs to help field advanced technology capabilities and to work with nontraditional contractors. From the researcher’s perspective, despite the growing popularity of OTs, a segment of nontraditional contractors remains averse to working with DoD. As one participant pointed out, “You would be surprised at the number of companies that have this hot technology that doesn't work with us” (MDA).

Chapter 1 discusses the enduring social narrative of great American innovators such as Benjamin Franklin, Thomas Edison, and the Wright Brothers, and how these inventors shaped the nation's image as a world leader in innovation. Today, innovators such as Elon Musk and Bill Gates keep this narrative alive in the nation’s imagination. Within DoD, there is a belief that OTs may be the only procurement tool that will be effective in attracting these types of innovators to offer breakthrough technologies to DoD.

Nontraditional contractors are still a relatively untapped reservoir of innovation. Nontraditional contractors are often small businesses. The SBIR program and other small business policies implemented in the FAR and DFARS have institutionalized requirements for DoD organizations to create funding opportunities for small businesses. Thus, OTs may be viewed as another congressionally directed requirement for increasing DoD funding opportunities for the small business sector. Under the 2017 amendments to the OT statute, small businesses taking part in the SBIR program can now be awarded OTs (2371b, 2017, para.

(d)(2)(B)). Thus, the SBIR program offers a new pool of nontraditional contractors that may take part in the DoD OT program.

A related consolidated major finding under conceptual framework category 2 (OT Advantages) is: OTs impact the ability of organizations to attract advanced technology contractors, enabling new technology solutions for mission needs. This consolidated major finding is like the major finding above, and so the discussion above applies here. These DoD organization related factors may be sources of endogenous institutional change in the DoD OT program.

OT terms and conditions

The second theme—OT terms and conditions—is used to group OT terms and conditions related consolidated major findings that show endogenous institutional change is occurring in the DoD OT program. For example, under conceptual framework category 1 (OT Award), a consolidated major finding is: OTs offer flexible terms and conditions, for instance, the government can accept funding from the contractor. From the researcher’s perspective, DoD employees believe the DoD procurement system is inflexible and that this impedes DoD from getting the best value from taxpayer dollars. Federal procurement regulations are rigid, for example, the intellectual property regulations in the DFARS and the bid protest process institutionalized by the FAR.

Employees see OTs as a way around the bureaucratic barriers created by the current, long-established procurement system. Not only do OTs enable organizations to get better value for taxpayers’ dollars, OTs also help DoD organization more effectively respond to budget

pressures and policy initiatives to cut costs. For instance, OTs enable cost sharing by contractors, which is not allowed in traditional procurement contracts. Every dollar of cost share paid by an OT contractor reduces the amount of funding that the DoD organization would otherwise have to expend to carry out the OT project.

A related consolidated major finding under conceptual framework category 2 (OT Advantages Versus TPAs) is: OTs offer simpler and more flexible terms and conditions than TPAs, for instance, changing an OT is easier, and the government can accept funding and in-kind contributions from the OT contractor. This consolidated major finding is like the major finding above. The discussion of that major finding applies to this consolidated major finding. Thus, no further discussion will be provided here.

Another consolidated major finding under conceptual framework category 2 is: Fewer rules and regulations apply to OT than TPAs. From the researcher's perspective, participant remarks followed the OT literature by confirming that a major advantage of OTs over traditional procurement agreements is that OTs are, by design, subject to many fewer rules and regulations. OTs are excluded from most of the FAR and DFARS regulations. As discussed in Chapter 1, they are also excluded from DCAA pre-award and post-award audits. If DoD organizations have established local processes for OTs, these processes generally are more streamlined than local rules implementing the FAR and DFARS. These OT terms and conditions related factors may be sources of endogenous institutional change in the DoD OT program.

OT advantages

The third theme—OT advantages—is used to group OT advantages related consolidated major findings that show endogenous institutional change is occurring in the DoD OT program. For example, under conceptual framework category 2 (OT Advantages Versus TPAs), a consolidated major finding is: OTs improve communication and collaboration between the parties. From the researcher’s perspective, OTs are not subject to many of the laws and regulations that complicate traditional procurement agreement negotiations. Some of these regulations—such as cost accounting standards and intellectual property regulations—can frustrate traditional procurement agreement negotiations, not only for the contractor but also for the government negotiators. There are also stringent regulations that formalize, and often restrict, communications between the negotiating contracting parties.

In contrast, OTs offer both sides a process where they can more freely talk to each other about what they need for the project. OT projects involve advanced technologies, and to negotiate the project’s technical deliverables requires open communication between the parties. Thus, institutional actors—government and contractor—may find using OTs to be a more workable alternative than traditional procurement agreements.

A consolidated major finding under conceptual framework category 4 (Numbers of OTs Versus TPAs) is: OT advantages such as speed to award impacts the numbers of OTs. From the researcher’s perspective, participants observed that OTs sometimes take longer to negotiate than traditional procurement agreements. This surprised the researcher since the general anecdotal evidence in the DoD procurement community is that OTs are desirable because they are faster to

award. The study's findings show that OTs are not always faster than traditional procurement agreements and sometimes may be slower.

But it is unsurprising that participants noted that speed toward is a desirable characteristic of a procurement agreement, and that speed drives what type of procurement instrument is selected for a particular project. Contracting officers and agreements officers are often under pressure to award quickly so that the program or project can get underway and carry out its objectives. Thus, if OTs are slower to award than TPAs, contracting officers and agreements officers will steer away from them and continue to rely on traditional procurement agreements.

These OT advantages related factors may be sources of endogenous institutional change in the DoD OT program. So, several consolidated major findings showed that endogenous institutional change in the DoD OT program. The research hypothesis postulates that endogenous institutional change is occurring at some DoD organization in the DoD OT program. Thus, the consolidated major findings discussed above are not inconsistent with the research hypothesis.

Positive feedback mechanisms

Figure 16 illustrates that positive feedback mechanisms are a concept of historical institutionalism. The literature review in Chapter 2 discusses how traditional historical institutionalism scholarship conceptualizes positive feedback mechanisms as self-reinforcing policy processes that narrow the range of options available to institutional actors (Jacobs, 2015). Positive feedback mechanisms are an essential theoretical element of path dependence because feedback mechanisms act to reinforce and maintain institutional path dependence. Thus,

According to Thelen (1999), the key to understanding institutions is defining the positive feedback mechanisms of path dependence.

Jacobs (2015) adds to the positive feedback mechanism scholarship by discussing how institutional positive feedback mechanisms can include emotional reactions, cognitive biases, and political processes. For the study, the concept of positive feedback mechanisms is used to interpret and synthesize consolidate major findings that appear to reinforce the continued use of traditional procurement agreements over OTs. The concept of endogenous institutional change applies to the research hypothesis because positive feedback mechanisms act against endogenous institutional change in the DoD OT program.

Chapter 2 discusses the prior literature and its varying perspectives on the role of positive feedback mechanisms in historical institutionalism. Here, the concept of positive feedback mechanisms is used to synthesize the consolidated major findings related to the continued use of traditional procurement agreements over OTs. Several consolidated major findings appear to support that the concept of positive feedback mechanisms applies to the DoD OT program. These consolidated major findings are organized under three themes: Culture, DoD organizations, and employees. The following Table summarizes the consolidated major findings corresponding to the historical institutionalism concept of positive feedback mechanisms, as organized under these three themes.

Table 34. Positive Feedback Mechanisms: Corresponding Consolidated Major Findings

Theme	Consolidated Major Findings and Conceptual Framework Category (CFC) Finding Numbers*
Culture	<ul style="list-style-type: none"> • DoD’s risk-intolerant culture discourages employees from using OTs and punishes any OT failure (CFC 3-vi) • DoD leadership insufficiently supports OTs (CFC 4-v) • Employees should not suffer adverse career consequences just because an OT fails (CFC 5-v)
DoD organizations	<ul style="list-style-type: none"> • DCMA is unfamiliar with OTs, impeding the wider use of OTs (CFC 3-vii) • The Army's failed FCS program continues to impact the wider use of OTs by DoD (CFC 3-viii)
Employees	<ul style="list-style-type: none"> • Employees are used to relying on familiar procurement regulations and policies (CFC 4-viii) • Employees are risk-averse to try new procurement processes such as OTs (CFC 4-ix)

Source: Author.

* CFC finding numbers are from Appendix HH.

Culture

The first theme—culture—is used to group culture related consolidated major findings that may show positive feedback mechanisms in the DoD OT program. For example, under conceptual framework category 3 (OT Disadvantages Versus TPAs), a consolidated major finding is: DoD’s risk-intolerant culture discourages employees from using OTs and punishes any OT failure. From the researcher’s perspective, there are sometimes negative consequences when a DoD contract or program fails. As discussed in Chapter 1, the FAR and DFARS increase transparency, integrity, and accountability in federal procurement practices. But for DoD to

maintain these norms, employees such as contracting officers face administrative sanctions, and even criminal penalties, when a failure occurs in a traditional procurement agreement.

Contractors can incur negative performance ratings when a contract fails, thereby negatively impacting their ability to compete for future contracts. So, contract failures can negatively impact DoD employees and contractors. The mission of DoD is not well aligned to tolerate failure, and this intolerance of failure applies in the procurement arena. Since OTs are meant for developing advanced technologies—often where there is high technical risk and reward—OTs sometimes fail. Given a DoD culture of risk intolerance and punishing failure, it is unsurprising that there may be a reluctance by employees to try something as new and risky as OTs.

A consolidated major related finding under conceptual framework category 4 (Number of OTs Versus TPAs) is: DoD leadership insufficiently supports OTs. From the researcher's perspective, participants discussed that most DoD requirements are for goods and services and that these requirements are best fulfilled by using traditional procurement agreements. Most DoD organizations are familiar with how to buy goods and services using the established FAR and DFARS procurement processes. Thus, participant remarks for this consolidated major finding reflect the sedimented precepts of federal procurement and the DoD procurement system. While participants did not know the exact numbers of OTs compared to traditional procurement agreements awarded by DoD, most believed there were many more traditional procurement agreements awarded than OTs. This disparity may simply show that most of what DoD buys is goods and services, not R&D services.

Another related consolidated major finding under conceptual framework category 5 (What can be Changed) is: Employees should not suffer adverse career consequences just because an OT fails. From the researcher's perspective, this consolidated major finding follows

a frequent theme in participant remarks: Without administrative safeguards of the FAR and DFARS, employees believe they will be blamed if they leave out a significant term and condition in an OT. The researcher's professional experience has been that DoD IG and GAO audits frequently occur after a program or project fails. Moreover, OTs sometimes fail, for instance, when the technology being developed under the OT does not pan out. There is a lot of congressional oversight of DoD, and the legislative history of the OT statute shows that Congress remains interested in the performance of the DoD OT program. The combination of being more prone to failure than traditional procurement agreements, and being subject to enhanced congressional scrutiny, makes OTs fertile ground for audit and inspection. Thus, it is unsurprising that participants want assurances from their chain of command that they will not suffer adverse career consequences when an OT fails, since failure is more frequent for OTs because of the risks and uncertainty inherent to developing advanced technologies. These culture-related factors may be sources of positive feedback mechanisms in the DoD OT program.

DoD organizations

The second theme—DoD organizations—is used to group DoD organization related consolidate major findings that may show positive feedback mechanisms in the DoD OT program. For instance, a consolidated major finding under conceptual framework category 3 (OT Disadvantages) is: DCMA is unfamiliar with OTs, impeding the wider use of OTs. From the researcher's perspective, the mission of DCMA is focused on administering procurement contracts, not OTs. DCMA does not award OTs, nor does its mission include developing advanced technologies. Participants remarked that OTs are time-consuming to administer.

DCMA personnel lack training on OTs. Because DCMA may be reluctant to manage OTs, DoD organizations will have to administer OTs themselves.

Another consolidated major finding under conceptual framework category 3 is: The Army's failed FCS program continues to impact the wider use of OTs by DoD. From the researcher's perspective, the specter of FCS continues to loom over the DoD OT program. This may be because of FCS was such a high-profile program for the Army. It is well known by DoD employees that FCS was a significant failure and, as discussed in Chapter 3, that Senator McCain disliked the FCS program, specifically, the program's use of an OT instead of a TPA (McCain, 2005). There was negative publicity surrounding FCS, including allegations that it was an example of fraud, waste, and abuse by the government (POGO, 2017).

DoD has a long institutional memory for failure. This may explain why FCS continues to linger in its institutional memory and to chill DoD organizations from trying OTs. Senior leadership remembers the FCS experience, and when presented with the choice to use an OT for a big project, they recall FCS and question what has changed since then. Thus, risk aversion and sedimentation of entrenched institutional processes may contribute to the continuing stigmatic impact of FCS on OTs. FCS may be a positive feedback mechanism that cause DoD organizations to steer away from using OTs. These DoD organization related factors may be sources of positive feedback mechanisms in the DoD OT program.

Employees

The third theme—employees—is used to group employee related consolidated major finding that may show positive feedback mechanisms in the DoD OT program. A consolidated

major finding under conceptual framework category 4 (Numbers of OTs Versus TPAs) is: Employees are risk-averse to try new procurement processes such as OTs. A related major finding under conceptual framework category 4 is: Employees are used to relying on familiar procurement regulations and policies.

From the researcher's perspective, it is unsurprising that employees are risk-averse to try something new like OTs. It is also unsurprising that employees are used to relying on traditional procurement agreements. Employees are trained to use traditional procurement agreements; they are not trained to use OTs. The FAR and DFARS cover most problems that comes up in the negotiation and administration of traditional procurement agreements. There is no such guidance for OTs for employees to rely on when problems crop up.

There are plenty of training resources for traditional procurement agreements. These resources are available to employees, online and in-person. There is not a similar depth or availability of training for OTs. Employees can rely on their coworkers to help them learn how to negotiate and administer traditional procurement agreements. Many organizations have experienced contracting workforces that have been negotiating traditional procurement agreements for decades. Senior employees mentor junior employees and teach them the tradecraft of negotiating and administering traditional procurement agreements.

There is no such depth of tradecraft in the procurement workforce for OTs. Indeed, study participants corroborated that some organizations have few or no employees experienced in OTs. Participant remarks about a culture of risk aversion appeared to be right on the mark. The researcher's professional experience in DoD is that there is a fear of an audit or administrative sanctions if an employee makes a mistake. There seems to be a persistent lack of leadership support for OTs. The general lack of OT training for DoD employees is well documented in the

prior literature. Moreover, as participants and the prior literature noted, with an OT you start with a blank sheet of paper. Employees must rely on their experience and skill to negotiate an agreement that meets the needs of the parties. There are no FAR or DFARS to refer to or fall back on for guidance when a problem crops up, for instance, when negotiating OT terms and conditions. These factors may account for several participants stating that an OT sometimes take longer to negotiate than an analogous traditional procurement agreement.

These employee-related factors may be sources of positive feedback mechanisms in the DoD OT program. So, several major findings show positive feedback mechanisms in the DoD OT program. The research hypothesis postulates that institutional change is occurring at some DoD organizations. These consolidated major findings discussed above are inconsistent with this element of the hypotheses.

Tipping points or critical junctures

Figure 16 illustrates that tipping points or critical junctures are concepts of historical institutionalism. The literature review in Chapter 2 discusses that institutions are formed or significantly reformed during critical junctures. A critical juncture is a short period where significant institutional change can occur because existing institutional processes did not offer adequate solutions to existing institutional challenges or where existing political arrangements need an institutional solution (Sorensen, 2015). Thus, a critical juncture is a brief time span where there is a high probability that institutional agents' choices will impact the institutional outcome or agency, and a time where contingency is paramount (Capoccia, 2007). Critical junctures are the conceptual precursor of path dependence. Schreyögg (2009) explains that path

dependence has three phases: The preformation phase that coincides with critical junctures; the formation phase where institutional arrangements are initially set; and the dominant or path-dependent phase where the range of permissible solutions is narrowed.

Tipping points are not the same as critical junctures. Tipping points result from gradual accumulative change. In contrast, critical junctures can happen suddenly. Capoccia (2007) distinguishes critical junctures from the gradual accumulation of changes that can also result in an institutional tipping point followed by significant institutional change. So, a tipping point is not a critical juncture, nor is it an element of a critical juncture. Capoccia discussion of tipping points informed the study's research hypotheses that ongoing endogenous changes in the DoD OT program may lead to a policy tipping point that will cause wider DoD use of OTs.

Chapter 2 summarizes the prior literature and the varying perspectives on the roles of tipping points and critical junctures in historical institutionalism. For synthesis, several consolidated major findings support that the concepts of tipping points and critical juncture apply to the DoD OT program. These consolidated major findings are organized and discussed under two themes—leadership and training and resources. The concepts of critical junctures and tipping points are theorized, but unstated, potential institutional outcomes of the research hypothesis. The following Table summarizes the consolidated major findings corresponding to the concepts of tipping points or critical junctures, as organized under these two themes.

Table 35. Tipping Points or Critical Junctures: Corresponding Consolidated Major Findings

Theme	Consolidated Major Findings and Conceptual Framework Category (CFC) Finding Numbers*
Leadership	<ul style="list-style-type: none"> • Leadership must actively and publicly support OTs (CFC 5-ii) • Employees should be delegated more authority and independence to use OTs (CFC 5-iv)
Training and resources	<ul style="list-style-type: none"> • More OT policy guidance, OT templates, and knowledge management tools will help employees use OTs (CFC 5) • Adopting OT best practices from other federal agencies will help DoD to use OTs (CFC 5-vi) • Providing training information to nontraditional contractors will make them more willing to use OTs (CFC 5-vii) • Providing more resources to DoD contracting agents will make them more willing to use OTs (CFC 5-viii)

Source: Author.

* CFC finding numbers are from Appendix HH.

Leadership

The first theme—leadership—is used to group leadership related consolidated major findings that reflect future tipping points or critical junctures in the DoD OT program. For example, under conceptual framework category 5 (What can be Changed), a consolidated major finding is: Leadership must actively and publicly support OTs. From the researcher's perspective, it makes sense that without active leadership support there is no top-down signal from leadership to employees that it is okay to use OTs. Without this signal, employee risk aversion, inertia, and lack of knowledge about OTs will persist. Indeed, participant remarks

showed that some employees still believe OTs are illegal. Few DoD policies publicize leadership support for OTs. This environment is the antithesis of what Sumption (1999) recommends when she discusses the need for leadership at the helm of changing DoD to use OTs more widely.

Another consolidated major finding under conceptual framework category 5 is: Employees should be delegated more authority and independence to use OTs. From the researcher's perspective, the DoD OT Guide states that only warranted contracting officers can award OTs. But there is no guidance or DoD-level policy on how OT authority should be delegated from headquarters organizations to field organizations.

Thus, the current OT policy regime limits negotiations to warranted contracting officers, many that have already have heavy traditional procurement agreements workloads. There is no published guidance on how field level DoD organizations can get OT authority delegated to them. This consolidated major finding points to policy problems would be easy for DoD to remedy. These leadership related factors could lead to tipping points and critical junctures in the DoD OT program.

Training and resources

The second theme—training and resources—is used to group training and resources related consolidated major findings that show future tipping points or critical junctures in the DoD OT program. For example, under conceptual framework category 5 (What can be Changed), a consolidated major finding is: More OT policy guidance, OT templates, and knowledge management tools will help employees use OTs. From the researcher's perspective, a

surprising insight related this consolidated major finding is that many employees want OT templates. Yet this is inconsistent with the general policy and OT literature mantra that templates will stifle innovation in crafting OT terms and conditions. But the reality at the working level is that employees want and need templates to help them jumpstart wider use of OTs at their organization. It would be straightforward to set up a DoD website where OT policy, guidance, templates and other knowledge management tools could be consolidated for employees to use. In the same manner, more policy guidance from DoD leadership might be helpful in promoting wider use of OTs. For instance, new guidance could dispel the lingering belief that OTs are illegal or frowned upon by leadership. Thus, more training, for instance, training available on a public website, and other policy guidance might make employees more comfortable and less risk-averse to use OTs.

Another consolidated major finding under conceptual framework category 5 is: Adopting OT best practices from other federal agencies will help DoD to use OTs. From the researcher's perspective, other federal agencies such as DHS, the TSA, and NASA have valuable OT experience. DoD does not appear to be tapping into that experience to improve its OT program. There does not appear to be any systematic knowledge sharing about OTs amongst federal agencies. This consolidated major finding points to a straightforward policy recommendation: Establish processes for sharing information about OTs between federal agencies. Information sharing may lead to the wider use of OTs by DoD.

An added consolidated major finding under conceptual framework category 5 is: Providing training information to nontraditional contractors will make them more willing to use OTs. From the researcher's perspective, this is a valuable major finding. The researcher was surprised that this finding is not covered by the prior OT literature. Providing OT training

resources for contractors would likely help the DoD OT program. Much like for DoD employees, many contractors are unfamiliar with OTs. This discourages them from applying for OT funding opportunities. Untrained contractors contribute to OT negotiations taking longer than they would if the contractors had prior OT training. Providing training resources to contractors—for instance, on a public DoD website—would help the DoD OT program, likely at minimal cost.

Still another consolidated major finding under conceptual framework category 5 is: Providing more resources to DoD contracting agents will make them more willing to use OTs. From the researcher's perspective, contracting agents are unfamiliar with OTs. Participants noted that OTs are sometimes more time-consuming to negotiate and administer than traditional procurement agreements. This consolidated major finding shows that part of this problem may be because contracting agents lack sufficient resources—for instance, OT training resources—to help other DoD organizations with their OT negotiation and award needs. The prior literature shows that DoD procurement activities have a heavy acquisition workload. This workload contributes to this consolidated major finding.

Contracting agents charge administrative fees based on contracting support services they give to DoD organizations. Thus, OTs represent a valuable source of recurring revenue for these organizations. Nevertheless, without enough resources, for instance, training resources, to help contracting agents become skilled in negotiating and awarding OTs, this potential source of revenue will not be fully realized. These training and resources related factors could lead to tipping points and critical junctures in the DoD OT program. So, several major findings could lead to tipping points and critical junctures in the DoD OT program. The research hypothesis postulates that endogenous institutional change is occurring in the DoD OT program. If this

change is happening and continues to accumulate, a tipping point or a critical juncture would be the next conceptual marker of wider use of OTs by DoD. Thus, the findings discussed above are not inconsistent with the research hypothesis.

Revisiting the initial assumptions from Chapter 1

The second section of the synthesis discussion is to revisit the study's initial assumptions. In Chapter 1, the researcher makes eight initial assumptions about the study. These assumptions were based on the researcher's professional experience in the DoD OT program and on the prior literature topics discussed in Chapter 2. But now that the fieldwork is completed, and the study data has been analyzed and interpreted, it is appropriate to revisit these initial assumptions to consider what has been learned from the study.

The first initial assumption is: OTs are a useful type of non-procurement agreement that could be more widely used by DoD. The first assumption turns out to be true. Several consolidated major findings under conceptual framework category 1 (OT Award) and conceptual framework category 2 (OT Advantages Versus TPAs) indicate that OTs are a useful type of R&D instrument. For example, a consolidated major finding is: DoD organizations select OTs instead of traditional procurement agreement to help field advanced technology capabilities and to work with nontraditional contractors. Two other consolidated major findings are: OTs offer simpler and more flexible terms and conditions than traditional procurement agreements, and fewer rules and regulations that apply to OTs than traditional procurement agreements. Yet OTs are not very widely used by DoD. As discussed in Chapter 1, in fiscal year 2015 DoD spent \$0.6 billion on OTs—a small percentage of its overall \$63.5 billion RDT&E budget. While recent data shows

an uptick in OT spending since 2015, OT spending remains a small portion of overall DoD R&D spending. Reflecting these budget numbers, participant demographic survey data from Chapters 4 and 5 shows that the majority participants (22 of 30) have worked on less than ten OTs. So, while the study found that OTs are a useful R&D agreement, the study data shows that DoD could more widely use OTs. Thus, the first initial assumption is true.

The second initial assumption is: It would be beneficial for DoD to more widely use OTs. This assumption holds true for the same reasons discussed above for initial assumption one. A consolidated major finding under conceptual framework category 2 is: OTs impact the ability of organizations to attract advanced technology contractors, enabling new technology solutions for mission needs. None of the consolidated major findings under conceptual framework category 3 (OT Disadvantages versus OTs) find that it would not be beneficial for DoD to more widely use OTs. Instead, the disadvantages point to employee and institutional barriers that prevent the wider use of OTs. For instance, lack of OT expertise discourages employees from trying OTs. DoD's risk-intolerant culture discourages employees from using OTs and punishes OT failure. So, while the study find that there are disadvantages of OTs, none indicated that it would not be beneficial for DoD to more widely use OTs. In fact, most of the consolidated major findings show that it would be helpful for DoD to more use OTs. So, the second initial assumption is true.

The third initial assumption is: Congress has amended and expanded OT authority to encourage DoD to more widely use OTs. This assumption assumes there are no legislative barriers to wider DoD use of OTs. This assumption holds true. The legislative history of the OT statute shows that Congress has encouraged DoD to use OTs more widely use OTs. In particular, the legislative history of amendments to the OT statute in the NDAAs for fiscal years 2016 and

2018—both discussed in Chapters and 1 and 2—show that Congress is providing DoD with the statutory authorities and encouragement to more widely use OTs. The study finds no significant legislative barriers to DoD more widely using OTs. So, the third initial assumption is true.

The fourth initial assumption is: DoD organizations understand relevant DoD OT policy, and these organizations are not avoiding using OTs. This assumption assumes that DoD organizations are interested in more widely using OTs. This assumption turns out to be partly true. Study data shows that DoD organizations—for instance, DARPA, DIUx, Picatinny Arsenal, PEO-CBD, and SCO—understand relevant DoD OT policy and are using OTs for mission needs. But other DoD organizations—for instance, SPAWAR, MDA, and USSOCOM—have not used OTs to the same extent as these DoD organizations. The major findings under conceptual framework category 3 (OT Disadvantages Versus TPAs), conceptual framework category 4 (Numbers of OTs Versus TPAs), and conceptual framework category 5 (What can be Changed) provide insights into why some organization misunderstand relevant DoD OT policy and may be avoiding using OTs. For instance, the Army's failed FCS program continues to negatively impact the wider use of OTs by DoD. DoD leadership insufficiently supports OTs. In addition, adopting OT best practices from other federal agencies would help DoD more widely use OTs. So, the fourth initial assumption is partly true.

The fifth initial assumption is: There are no major institutional barriers for DoD organizations to get OT authority delegated to them by their chain of command. This assumption is false. Study participants pointed to lack of delegated OT authority for their organization as a barrier to more widely using OTs. Participants also discussed that employees need more independence and delegated authority to use OTs. Participants discussed lack of leadership support and turf battles that impede the wider use of OTs. These barrier factors are reflected in

the consolidated major findings. For example, a consolidated major finding under conceptual framework category 3 (OT Disadvantages Versus TPAs) is: Employees resist change (OTs) because they fear losing control of procurement processes and turf. Under conceptual framework category 5 (What can be Changed), a consolidated major finding is: Leadership must actively and publicly support OTs. While there are institutional barriers for DoD organization to get delegated OT authority, there are additional institutional barriers within DoD organization that result in employees having insufficient delegated authority and institutional support to use OTs more widely. So, the fifth initial assumption is false.

The sixth initial assumption is: DoD program, and procurement officials understand major pros and cons of OTs compared to traditional procurement agreements. This assumption ends up being false. Several of the study's major findings show that DoD officials and DoD organizations remain unfamiliar with OTs. For example, under conceptual framework category 3 (OT Disadvantages Versus TPAs), a major finding is: It is uncertain what OT terms are mandatory versus negotiable. In addition, as mentioned, lack of expertise discourages employees from trying OTs. DCMA, the organization that administers many DoD contracts, is unfamiliar with OTs, impeding the wider use of OTs. Under conceptual framework category 4 (Numbers of OTs Versus TPAs), a consolidated major finding is: Employees are risk-averse to try new procurement processes. Thus, while the pros and cons of OTs are well documented in the prior literature and were discussed at length by the study participants, it is apparent that some DoD officials and DoD organizations remain largely unfamiliar with OTs. So, the sixth initial assumption is false.

The seventh initial assumption is: DoD employees have sufficient professional training and experience to know how to negotiate and administer an OT, or if they do not, training is

available to them. This assumption turns out to be false. Most study participants believed the lack of OT training is a major factor that contributes to DoD continuing to only sparingly use OTs. The study's consolidated major findings support this belief. For instance, a consolidated major finding under conceptual framework category 4 (Numbers of OTs Versus TPAs) is: There is insufficient training and policy guidance for OTs. Under conceptual framework category 5 (What can be Change) a consolidated major finding is: More OT policy guidance; OT templates, and knowledge management tools will help employees use OTs. Another consolidated major finding is: Providing training information to nontraditional contractor would make them more willing to use OTs. These consolidated major findings indicate that DoD employees do not have enough professional training and experience to negotiate and administer OTs. The emphasis on the lack of such training indicates that effective OT training is not widely available to DoD employees. So, the seventh initial assumption is false.

The study also made an eighth initial assumption about policy change. The study initially assumed the orthodox (homeostatic) model of policy change applied to the DoD program. This assumption turns out to be false. Under the homeostatic model of policy change, only paradigmatic change creates new policies, and the source of such change is exogenous to the institution (Howlett, 2009). Absent such paradigmatic change, policy change is only incremental. As discussed in Chapter 2, DoD recently issued updated OT guidance—the 2017 edition of the DoD OT Guide. This is an update to the initial 2002 version of the Guide and was prompted by an exogenous change—recent major legislative amendments to the OT statute. But study participants discussed a renewed DoD leadership interest in using OTs. While legislative and budget pressures may account for such interest, there appears to be endogenous institutional factors involved, for example, the need for advanced technology solutions to counter terrorism

and peer-state military advances. Thus, the researcher believes there are several sources of internal change in the DoD OT program that are leading to new OT policies and guidance.

Several of the major findings reflect this belief. For example, under conceptual framework category 1 (OT Award), a consolidated major finding is: DoD organizations select OTs instead of traditional procurement agreement to help field advance technology capabilities and to work with nontraditional contractors. Under conceptual framework category 2 (OT Advantages Versus TPAs), a similar consolidated major finding is: OTs impact the ability of organizations to attract advanced technology contractors, enabling new technology solutions for mission needs. In addition, under conceptual framework category 2 (Numbers of OTs Versus TPAs) a major finding is: Organizations with R&D mission have higher numbers of OTs. While there are evident exogenous factors that may account for OT policy change in DoD—for example, repeated expansion of delegated OT authority by Congress—the study finds that endogenous factors such as those above are also contributing to the renewed DoD leadership interest in using OTs more widely. So, the eighth initial assumption is false.

The following Table summarizes the results of revisiting the initial assumptions from Chapter 1 and indicates whether each initial assumption turned out to be true or false based on data collected, analyzed, and interpreted by the study.

Table 36. Results of Revisiting the Initial Assumptions from Chapter 1

Initial Assumption (from Chapter 1)	Initial Assumption Turns Out to be:
1. OTs are a useful type of R&D agreement that could be more widely used by DoD	True
2. It would be beneficial for DoD to more widely use OT	True
3. Congress has amended and expanded OT authority to encourage DoD to more widely use OTs	True
4. DoD organizations understand relevant DoD OT policy, and these organizations are not avoiding using OTs	Partly True*
5. There are no major institutional barriers for DoD organizations to get OT authority delegated to them by their chain of command	False*
6. DoD program and procurement officials understand major pros and cons of OTs compared to traditional procurement agreements	False*
7. DoD personnel have sufficient professional training and experience to know how to negotiate and administer an OT, or if they do not, sufficient training is available to them	False*
8. The orthodox (homeostatic) model of policy change applied to the DoD program	False

Sources: Chapters 1, 4, and 5.

* A policy recommendation related to this initial assumption is provided in Chapter 7.

Interpretation and Synthesis Summary

In summary, the preceding interpretation and synthesis discussion provides insights into the research question of why DoD only sparingly uses OTs compared to traditional procurement agreements. The triangulation process discussed above enables the researcher to derive consolidated major findings that reflect the aggregated major findings from the organization interviews in Chapter 4 and the OT case studies in Chapter 5. The consolidated major findings are used to offer a narrative answer to the research question.

The prior literature and participants highlighted advantages and disadvantages of OTs compared to traditional procurement agreement. The participants discussed factors they believe explain the low numbers of OTs versus traditional procurement agreements. The study's consolidated major findings relate to DoD culture, leadership, employees and training may, to a lesser or greater extent, account for institutional resistance to the wider use of OTs by DoD. The study's consolidated major findings reflect the concepts of historical institutionalism, including path dependence and positive feedback mechanisms. The study's findings are consistent with inferring that endogenous institutional change is occurring, and that this may lead to a critical juncture or policy tipping point, resulting in the wider use of OTs by DoD. So, the research hypothesis appears not to be false, and therefore, can be accepted. The preceding synthesis discussion indicates that the concepts of historical institutionalism can be usefully applied to investigate other policy issues in the DoD OT program. Thus, historical institutionalism appears to be a useful theoretical lens for future research of the DoD OT program. The consolidated major findings and the results of revisiting the initial assumptions show there may be policy recommendations to encourage wider use of OTs by DoD.

Chapter 7–Conclusions and Recommendations

Introduction

This chapter provides the study's conclusions and recommendations. As discussed in Chapter 6, the major findings for the OT cases studies successfully triangulated the major findings for the organization interviews. Triangulation led to consolidated major findings and potential causal mechanisms derived from these major findings. The consolidated major findings are used to provide a narrative answer the research question, which is: Why, despite their reported administrative advantages, are OTs only sparingly used by DoD compared to more administratively burdensome traditional procurement agreements?

Chapter 6 also interprets and synthesizes the consolidated major findings. Interpretation and synthesis provides insights into the research hypothesis, which is: Although Congress has amended the OT statute to encourage wider use OTs, DoD has continued to use OTs sparingly. Based on the researcher's professional experience, institutional resistance to using OTs can be traced to path dependence and positive feedback mechanisms such as low leadership support and employee risk aversion and habit. The numbers and variety of OTs at some DoD organizations, however, indicate that institutional change is occurring, and this may lead to a critical juncture or policy tipping point, resulting in wider use of OTs across DoD.

The conclusions discussed in this chapter are based on the interpretation and synthesis of the consolidated major findings from Chapter 6. Thus, each of the conclusions can be traced back to the consolidated major findings and the researcher's analysis, interpretation, and

synthesis of the consolidated major findings. The goal is to make sure that conclusions and recommendations are supported by the study data.

This chapter culminates by offering six policy recommendations. The recommendations are traceable to the consolidated findings and are meant to be actionable, meaning they can be carried out at low cost using existing resources. The recommendations section below also suggests conducting future research of the DoD OT program. As discussed in Chapter 5, CPT and comparative cases studies can be used investigate longstanding policy problems related to use of OTs. The future research recommendation outlines how such research may be conducted using the potential causal mechanisms identified in this study with CPT to investigate other research questions about the DoD OT program.

Conclusions and Recommendations Consistency Chart

Bloomberg (2012) characterizes conclusions as explanations that are built from the research data using inductive reasoning. She explains that conclusions are conclusive statements of what you now know, having done the research, and that you did not know before. Research recommendations are based on corresponding conclusions. To make sure that conclusions are based on the research data, Bloomberg recommends preparing a consistency chart. A consistency chart tracks the findings from data interpretation to the conclusions, and finally to making recommendations; ensuring sure that these research elements are all aligned. Bloomberg stresses that it is essential when developing conclusions that they be logically related. So, there must be consistency among the conclusions, and the conclusions must be presented logically.

The researcher followed Bloomberg's consistency approach to making research conclusions and recommendations. Thus, Appendix JJ provides the study's conclusions and recommendations consistency chart. The consistency chart shows how each of the study's conclusions and recommendations can be traced from the consolidated major findings, to the corresponding interpretation and synthesis, then to the conclusions, and finally, to a study recommendation. The chart is organized by the study recommendations discussed at the end of this chapter. For example, the following Table is an extract from the Appendix JJ consistency chart for study recommendation four. The extract includes the chapter numbers where the data came from.

Table 37. Consistency Chart for Study Recommendation Four

Recommendation for updating OT policies and regulations

Consolidated Major Finding (Finding #)	Interpretation and Synthesis	Conclusions	Recommendation
Leadership must actively and publicly support OTs (5ii)	<ul style="list-style-type: none"> • The DoD OT Guide, alone, is enough guidance for most employees • Senior DoD leadership endorsement of OTs is needed • DoD leadership needs OT training • Lack of knowledge of OTs leads to resistance to change, using OTs 	<p>DoD has insufficient policy guidance to show strong leadership support for OTs and to encourage the wider use of OTs</p> <p>But DoD leadership should be cautious about creating additional policy guidance to show its support for OTs</p>	<p>Update existing policy guidance to show strong leadership support for OTs and establish circumstances where OTs are preferred.</p> <p>Update BBP 3.0, DoDI 5000, and the DAG. Also revise the OT regulations in 32 C.F.R. Part 3.</p>

Source: Appendix JJ. Table format adapted from Bloomberg (2012).

The rest of the conclusions and recommendations are similarly organized in the consistency table provided in Appendix JJ. The conclusions and recommendations discussion below follows the sequence of the conclusions and recommendations in the consistency chart. Not all the consolidated major findings led to conclusions and recommendations. Instead, the researcher focuses on selecting major findings that will best support actionable recommendations, meaning recommendations that can be implemented at low cost, using existing resources.

In the sections that follow, conclusions are discussed first. Recommendations are discussed second. The discussion below refers to the prior literature, meaning the prior literature discussed in Chapter 2. Since this literature has been previously discussed and cited, added citation to previously-cited literature is generally not provided in this chapter. The discussion below also refers to participant remarks, meaning interview data discussed in Chapters 4 and 5. Since these remarks have been previously discussed and cited, more citation is generally not provided in this chapter. But appropriate citation is provided for new source materials.

Conclusions

OT education and training resources for DoD employees and contractors

A major finding of the study is: Lack of OT expertise discourages employees from trying OTs. Study participants noted that in some DoD organizations it is hard to find employees with expertise in OTs. But DoD organizations with R&D missions may have more employees with OT expertise than other organizations. The prior historical institutionalism literature suggests

that limited knowledge, attention, and high coordination costs may deter employees from using OTs instead of traditional procurement agreements. Employee background ideational abilities perpetuate compliance with the FAR and DFARS and using traditional procurement agreements. These factors discourage employees from trying OTs.

Another major finding of the study is: There is insufficient training and policy guidance for OTs. Study participants remarked that the DoD workforce is only trained to use traditional procurement agreements, not OTs. The DAU does offer some basic OT training resources, for example, there are two available online course modules that provide introductory training on OTs (DOD(DAU), 2018c, pp. 175, 177). Nevertheless, it is apparent that many DoD employees lack expertise, even basic knowledge about OTs. Congress has recently taken legislative action in response to this problem. The NDAA for fiscal year 2018 directs DoD to ensure that DoD technical, management, and contracting personnel involved in negotiating and administering OTs are given adequate education and training about OTs (Pub. L. No. 115-91, 2017, Sec. 863; 10 U.S.C. 2371b, 2017, para. g(1)). Providing this training may lead to the wider use of OTs by DoD. Consistent with this idea, the prior historical institutionalism literature implies that local OT training provided by DoD organizations could cause neo-homeostatic change within the organizations, resulting in wider use of OTs across DoD.

Still another major finding of the study is: Providing training information to nontraditional contractors will make them more willing to use OTs. For example, making OT training available to nontraditional contractors will probably increase the numbers of these contractors that are willing to seek DoD OT funding opportunities. Educated contractors will help OT negotiations go more smoothly. Providing OT training to nontraditional contractors could probably lead to new KMPs and foster wider acceptance of OTs by private industry.

Moreover, even without other DoD policy changes to encourage the more extensive use of OTs, providing training to nontraditional contractors may, as taught by the prior historical institutionalism literature, cause endogenous institutional change through policy layering, conversion, or drift.

Two main conclusions can be inferred from these findings. First, DoD organizations must offer employees and nontraditional contractors adequate OT education and training resources to support the wider use of OTs. Second, providing such education and training will encourage more nontraditional contractors to propose to DoD OT funding opportunities and will speed up OT negotiations with these contractors. These conclusions align with a recent statement by DoD acquisition leadership expressing a wish to increase OTs to speed up acquisition and to enhance collaboration with commercial companies (Doubleday, 2018).

OT checklists and templates for DoD employees and contractors

A major finding of the study is: It is uncertain what OT terms are mandatory versus negotiable. OTs present a steep learning curve for most employees because they are unfamiliar with OTs. Unlike traditional procurement agreements, there are no standardized terms and conditions for OTs. While this makes OTs flexible; ironically, OTs may be too flexible. For example, even though starting with a blank sheet of paper presents opportunities to tailor the OT term and conditions to meet the needs of the parties, it can create problems if the parties lack the expertise to customize such terms and conditions from scratch. Unlike traditional procurement agreements, there is no automatic contract writing system for OTs. The lack of an automatic writing system for OT may deter employees from using OTs instead of traditional procurement

agreements. Participants' desire for OT templates may be a response to the lack of OT expertise and habituated reliance on the FAR and DFARS and long-established DoD procurement policies.

Another major finding of the study is: OTs take longer to negotiate than traditional procurement agreements. Participants discussed that it is a myth that OTs are quicker to negotiate than traditional procurement agreements. Often, it ends up taking longer to negotiate an OT than a traditional procurement agreement. Thus, employees may be discouraged to use an OT when they learn that it takes longer to negotiate than a comparable traditional procurement agreement. This consolidated major finding runs contrary to the prior OT literature, which touts speed to award as an advantage of OTs over traditional procurement agreements.

A related major finding of the study is: More OT policy guidance, OT templates knowledge management tools will help employees use OTs. Study participants explained they need OT templates to help them negotiate OTs. Participants also discussed the need for checklists to help them negotiate OTs, for instance, a list of what federal laws apply to OTs. Although OT checklists and templates may run contrary to the DoD OT Guide and other current sources of OT information, participants believed OT checklists and templates would help them jumpstart more extensive use of OTs at their organizations. Similarly, participants discussed the need for a DoD website with OT literature, guidance, and other information, including OT templates. Participants believed OT training should be mandatory for the DoD procurement workforce. Participants also called for providing OT training to contractors, particularly to nontraditional contractors.

A conclusion inferred from these findings is that DoD employees and contractors lack sufficient policy guidance and knowledge management tools—for instance, OT checklists and OT templates—to help them more widely use OTs. A checklist of laws and regulations that

apply to OTs would be helpful. Recent OT literature supports these conclusions, for instance, research discussing that lists of various statutes that apply or not apply to OTs have been issued by DoD and other federal agencies that have OT authority (Dunn, 2018). But as a matter of policy, DoD has not published a list of laws that apply to OTs.

FPDS

A major finding of the study is: Organizations with R&D missions have higher numbers of OTs. Some DoD organizations such as DARPA and DIUx have R&D missions. Other DoD organizations, for instance, the Army and Navy, do not primarily have R&D missions. Participants believed an organization's mission impacts how much it uses OTs. But participants were unsure of the actual extent of this phenomenon throughout the DoD. Participants were generally uninformed of OT practices at other DoD organizations. For example, participants did not have a good sense of how many and what types of OTs are being awarded by other DoD organizations. Further, participants noted that the availability of R&D funding might impact how widely organizations use OTs. But they were unsure whether other types of appropriated funds could be used for OTs. Participants suggested that Congress should authorize DoD to use any type of available appropriated funding for OTs.

As discussed in Chapter 2, a recent GAO report found a low use of OTs by federal agencies. DoD, for example, reported using OTs only about 10% as much as traditional procurement agreements. But there does not appear to be reliable public DoD data to support this assertion. The researcher found that FPDS does not accurately show the numbers and locations of OTs awarded by DoD organizations. For example, FPDS does not include

individual OT sub-projects awarded under consortium OTs. DoD has awarded many of this type of OTs. The NDAA for fiscal year 2018 clarified that these projects should be treated the same as other OTs (Pub. L. No. 115-91, 2017, Sec. 864(d)). Thus, as discussed below, it seems that FPDS should be used to record all individual OT sub-projects awarded under a consortium OT.

Relevant to the conclusion that follows, FPDS provides a comprehensive web-based tool for federal agencies to report contract actions (FAR, 2015, § 4.606). “Contract actions” means unclassified contracts with an estimated value of \$3,500 or more and all modifications to the contracts, regardless of dollar value (FAR, 2015, § 4.601). But the definition of contract actions excludes OTs (FAR, 2015, § 4.601). Under the FAR, Executive agencies, including DoD, are required to use FPDS to keep publicly available information about all unclassified contract actions (FAR, 2015, § 4.603). FPDS data is stored indefinitely and is electronically retrievable by DoD organizations (DFARS, 2015, § 206.204(2)). FPDS data is supposed to be used to report federal contracting data to Congress and to assess and measure the federal contracting system. “FPDS data is also meant to provide a basis for recurring and special reports to the President, the Congress, the GAO, federal executive agencies, and the general public” (FAR, 2015, § 4.602(a)(1)). FPDS data also provides a means of measuring and assessing the effect of federal contracting on the nation's economy, and to measure and assess the effect of policy and management initiatives (FAR, 2015, § 4.602(a)(4)).

Current DoD OT policy appears to be inconsistent with these FAR regulations. For instance, in 2016, USD(AT&L) issued policy guidance, designating OT authority to certain DoD organizations (DOD(AT&L), 2016). The policy also directed that “In order to promote transparency and maintain proper visibility, Agreements Officer shall record transactions entered into under section 2371b authority in the Federal Procurement Data System-Next Generation

located at <https://fpds.gov>” (DOD(AT&L), 2016, p. 2). However, the DFARS has not been updated to implement this policy change. The DoD OT Guide, which is guidance, not policy, also requires OTs to be recorded in FPDS: “Agreements Officers must record OTs entered into under section 2371b authority in the Federal Procurement Data System-Next Generation located at <https://www.fpds.gov>” (DOD(AT&L), 2017a, Sec. C2.1.1.8). Again, the DFARS has not been updated to implement this guidance.

The prior OT literature explains that DoD has been unsuccessful in identifying quantifiable metrics to measure the success of the DoD OT program. The only metric that has been used by DoD—participation of nontraditional contractors—has not been that helpful for assessing whether the DoD program has been successful in meeting its objectives. As Appendix O shows, FPDS includes data fields that could support quantifiable metrics for determining the scope and types of OTs awarded by DoD organizations, including the names of the DoD funding and contracting offices. FPDS has other data fields that could be used for DoD OT program metrics such as agency name, the type of OT agreement, and the dollar value of the agreement including options, and the number of nongovernment dollars contributed to the OT agreement.

Using FPDS to track use of OTs would be helpful for several reasons. For example, OT spending has increased since 2016, with DoD OT spending rising from about \$50 million in fiscal year 2015 to almost \$250 million in fiscal year 2016. In fiscal year 2017, DoD spent \$412 million on OTs (Doubleday, 2018). Thus, while there are increasing numbers of OTs and funding of OTs across DoD, there is no reliable quantitative dataset that can be used to assess and measure the overall success of the DoD OT program. FPDS would also be helpful because it is an existing database that is widely used across the DoD organizations to record and track traditional procurement agreement awards. FPDS has the same capabilities to track OT awards.

Congress has renewed interest in defense acquisition reform (Cox, 2018). One area of interest is for DoD to periodically report OT statistics to Congress. For example, in Section 204 of an early draft of the Accelerating the Pace of Acquisition Reform Act of 2018, the HASC is considering requiring DoD to report OT data. OT data will be reported annually to the congressional defense committees and will be required to include a detailed breakout of the numbers, dollar amounts, start and end dates, goals, and status and other data for OTs awarded by DoD in the preceding fiscal year (Thornberry, 2018). Thus, this prospective law points to a need for DoD leadership to have current DoD OT program data and metrics available to respond to congressional requirements for DoD to report OT data.

Two main conclusions can be inferred from these findings. First, if DoD organizations were required to use FPDS to record all unclassified OT awards, including individual OT projects awarded under consortium OTs, DoD could use the data develop reliable quantitative metrics for assessing and measuring the success of the DoD OT program. Second, using FPDS to record OT awards would give DoD reliable data to respond to congressional requirements for reporting DoD OT statistics, for instance, the numbers of OTs awarded by DoD organization with R&D missions and the types and amounts of appropriated funds spent on OTs.

OT policies and regulations

A major finding of the study is: Leadership must actively and publicly support OTs. Participants noted that the DoD OT Guide does not offer enough policy guidance to support wider use of OTs. Senior DoD leadership must endorse OTs and publicly state they support them. Leadership advocacy for OTs is vital if the DoD OT program is to expand and succeed.

But DoD leadership lacks familiarity with OTs. Thus, DoD leadership should be trained about OTs along with the rest of the DoD workforce. The widespread lack of knowledge about OTs across DoD at all levels of the procurement workforce leads to resistance to change—using OTs.

But there is a balance between too much regulation and too little regulation of the DoD OT program. There is currently only one DoD policy issuance on the DoD OT program, a two-page document that addresses the approval authority for high dollar value OTs. The DoD OT Guide, while believed useful by most study participants, is not a mandatory policy. And while there are DoD OT regulations, the regulations are out of date and, according to one commentator, have been ignored since they were published (Dunn, 2018). Thus, the extant OT regulatory and policy guidance is sparse and outdated.

Participants discussed the need for more policy guidance while recognizing that too much added guidance could stifle innovation and hold back organizations from using OTs.

Participants discussed the trend towards having too much OT policy guidance as “FAR-creep,” and, on the other side, having too little OT policy guidance as the “Wild West.” Reflecting this dichotomy, a recent news article observed that as part of the Pentagon's reorganization of acquisition, DoD officials want to make sure there is proper governance around new or enhanced authorities. A senior DoD official recently stated, “The most obvious example of such an authority is OTAs” (Doubleday, 2018, p. 1).

So, too much of OT governance may end up undercutting the flexibility that is a major advantage of OTs. But there is a plausible case for enhanced policy guidance since the DoD OT program is drawing increasing attention from private industry and Congress. For instance, the recent announcement of a DIUx follow-on production contract valued up to \$950 million procurement contract immediately drew sharp attention from the private sector procurement

community (Beutel, 2018). The contract was awarded noncompetitively based on a prior competitively awarded OT. The contract award decision was later protested by Oracle America, Inc. (GAO B-416061). In sustaining the protest, the GAO concluded that the Army (DIUx's contracting agent) did not appropriately use its OT authority to award the follow-on production contract (GAO B-416061, 2018, p. 11). Legal commentators noted that the size of the protested follow-on production contract "reflects increased comfort with issuing high-value production contract following preliminary work with DIUx under OT prototype agreements" (Cassidy, Jennifer, Evans, & Tyler, 2018). But the large size of the DIUx contract prompted another private sector commentator to conclude that "Perhaps OT production agreements may require a new and different form of program oversight and management" (Beutel, 2018, p. 2). Congress has recently expressed interest in amending the OT statute to provide more oversight of OT follow-on production contracts (Mazmanian, 2018). There are also signs that federal agency usage of OTs is accelerating. For instance, use of OTs has more than doubled in the past five fiscal year, to \$2.3 billion in fiscal year 2017 from \$1 billion in fiscal year 2012 (Vadiee & Garland, 2018, p. 1).

Two main conclusions can be inferred from this finding. First, DoD has insufficient policy guidance to show strong leadership support for OTs and foster the wider use of OTs. Second, leadership should be cautious about creating additional policy guidance to show its support for OTs, lest FAR-creep occur and result in stifling the flexibility that is key to successful use of OTs.

Availability of experienced agreements officers and program managers

Another major finding of the study is: Employees should be delegated more authority and independence to use OTs. Participants discussed challenges in getting sufficient OT authority delegated to their organization. It is difficult for organizations to get approval to award OTs with higher dollar thresholds. Leadership mistrust of subordinate DoD organizations and employees may underlie this problem. For example, the Pentagon may mistrust DoD field organizations to negotiate and award high dollar value OTs, particularly those with congressional interest. Recently, for instance, the Pentagon directed DIUx to reduce the \$950 million DIUx follow-on production contract discussed above to a ceiling \$65 million (GAO B-416061, 2018, p. 9). A GAO protest was later filed and sustained against the contract award, resulting in congressional plans to limit DoD's future use of follow-on production contracts (Mazmanian, 2018). Thus, OT training must go hand-in-hand with delegating employees more responsibilities and authorities to use OTs.

Two related major findings of the study are: OTs take longer to negotiate than TPAs because most terms are negotiable; and changes during an OT are time-consuming. These findings point to the need for experienced, well-trained agreements officers to negotiate OTs and for experienced, well-trained program managers to administer OTs, including administering OT changes. Participants discussed that it is sometimes difficult to find experienced agreements officers to help them negotiate and award OTs. Even when experienced agreements officers are available, their workload on other procurement projects may prevent them from doing OT work. OT projects involve advanced technology, which sometimes can only be understood by the

program manager. OT projects involve technical milestones that are sometimes difficult for anyone other than the program manager to develop and administer.

These challenges may have influenced recent legislation mandating OT training for the DoD workforce and a preference for using OTs. As discussed in Chapter 1 and above, the NDAA for fiscal year 2018 directed DoD to make sure that DoD technical, management, and contracting personnel involved in negotiating and administering OTs are given adequate education and training about OTs (Pub. L. No. 115-91, 2017, Sec. 863; 2371b, 2017, para. g(1)). In addition, DoD is now required to establish a preference for using OTs, to be applied in the circumstances determined appropriate by DoD, for using OTs (Pub. L. No. 115-91, 2017, Sec. 867). These laws show that needs for agreements officers and program managers experienced with OTs will probably increase in the coming years.

In addition to providing education and training to DoD management, technical, and contracting personnel involved in negotiating OTs, DoD is also required to “establish minimum levels and requirements for continuous and experiential learning for such personnel, including levels and requirements for acquisition certification programs” (Pub. L. No. 115-91, 2017, Sec. 863; 2371b, 2017, para. g(2)). This law points to the need for DoD update existing professional certification processes and standards for its management, technical, and contracting employees. Consistent with this law, existing DoD procurement policy set a goal to establish stronger qualification requirements for all acquisition specialties, including that contracting officer experience requirements “must be supplemented to establish a stronger basis for levels of professionalism across all acquisition career fields” (DOD(AT&L), 2015, p. 29).

DoD has well established professional certification processes for contracting officers and program managers (DOD(DAU), 2018b). The certification processes require that contracting

officers and program managers meet specified educational, acquisition training, functional training, and that education and experience requirements are commensurate with the level of assignment that the certified contracting officer or program manager can lead. There are three certification levels for contracting officers and program managers, with Level 1 being the lowest and Level 3 being the highest. Levels 1, 2, and 3 certified program managers, for example, must complete designated acquisition training as part of their core certification standards (DOD(DAU), 2018a). Representative activities of a Level 3 certified program manager include: “Organizes and leads DoD professional, administrative, and management support service contracting as relates to developing clearly stated and actionable requirements packages” (DOD(DAU), 2018a).

Two main conclusions can be inferred from these findings. First, DoD has a shortage of experienced agreements officers to negotiate and award OTs. Even where experienced agreements officers are available, their workload for other projects may prevent them from doing OT work. Second, experienced program managers are critical to negotiating and administering OTs. OT training and experience is not currently part of the DoD core certification requirements for these categories of critical employees.

Lessons learned from other federal agencies.

A major finding of the study is: Adopting OT best practice from other federal agencies will help DoD use OTs. The GAO has found that in addition to DoD, other federal agencies such as the TSA, NASA, and DHS use OTs. DHS has OT for prototype authority. The study data shows that program managers and agreements officers sometimes informally share

information with their counterparts in other federal agencies such as DHS. It may be beneficial to formalize these relationships through an interagency working group dedicated to sharing OT best practices across the federal government. Several interagency working groups are models for this approach. For example, DoD is now working with NASA, the FAA, and the National Reconnaissance Office on the space portion of a report on the state of the defense industrial base (Adams, 2018). Other interagency working groups focus on addressing long-range technical challenges. For instance, the Wireless Spectrum Interagency Working Group was formed in late 2010 to coordinate spectrum-related research and development activities both across the federal government and with academia and the private sector (WSRD IWG, 2016). These and other interagency working groups help systematize information sharing between federal agencies on topics of mutual interest. A conclusion that can be inferred from this finding is that DoD does not systematically share OT best practices with other federal agencies to improve the DoD OT program.

Future research of the DoD OT program

A conclusion that can be inferred from the study is that additional research of the DoD OT program may help DoD more widely use OTs. This section outlines a method for conducting such future research—CPT—and offers two examples of how CPT could help solve other unsolved policy problems in the DoD OT program. CPT can be used in tandem with the consolidated potential causal mechanisms from this study to carry out such future research. For instance, this approach could help investigate specific unsolved policy issues in the DoD OT program. Two examples are provided below.

Chapter 6 identifies potential causal mechanisms associated with each of the major findings for the organization interviews from Chapter 4 and the OT case studies from Chapter 5. The potential causal mechanisms are used to successfully triangulate the major findings from Chapter 4 using the major findings from Chapter 5. Because triangulation was determined to be successful, a set of consolidated potential causal mechanisms was prepared, reflecting the major findings from Chapter 4 and Chapter 5 together. The potential causal mechanisms are helpful in improving the internal and external validity of the study. Appendix HH provides the consolidated potential causal mechanisms.

The consolidated potential causal mechanisms may also be helpful for conducting future research of the DoD OT program using CPT. Using causal mechanisms to help make inductive research inferences is a hallmark of the CPT method (Kay & Baker, 2015; Reykers & Beach, 2017). The study did not use CPT as part of the research design and methodology because the study is exploratory. The researcher's review of the prior OT literature showed that there had been few if any, in-depth qualitative studies of the DoD OT program and none that systematically applied recognized policy research methods. At the beginning of the study, the researcher determined that there was insufficient information available to hypothesize potential causal mechanisms that could be tested using CPT and comparative OT case studies. The researcher concluded that it was unlikely that the study could use CPT to derive reliable inductive inferences for answering the research question.

But now, at the end of the study, the consolidated causal mechanisms discussed earlier in this chapter and provided in Appendix HH could be used in future research using CPT to investigate and research questions about specific institutional processes of the DoD OT program. With such potential future research in mind, the following discussion uses several of the

potential causal mechanisms identified in this study to offer examples of how these mechanisms and CPT could be helpful in future research of the DoD OT program.

But before discussing how CPT could be used in future research, an overview of the CPT literature is provided to help outline the major precepts of this research method. A summary of CPT is provided because, as discussed below, the relevant literature finds that CPT is a useful research method for case study designs that involve temporal analysis of open policymaking systems, including tipping points, path dependence, and other concepts of historical institutionalism. Chapter 2 discusses how historical institutionalism is the theoretical lens of this study. Thus, CPT may be useful to apply to future research studies of the DoD OT program that use historical institutionalism as a theoretical lens.

Kay and Baker (2015) summarize recent CPT literature. They explain how CPT has become a valuable research method of causal inference in qualitative policy studies, particularly for case study research relying on historical institutionalism. Kay and Baker argue that CPT is helpful for researching policy change, including research designs that use comparative case, small n, or even single-case methodologies. CPT is potentially useful for addressing the temporal complexity of open policymaking systems.

According to Reykers and Beach (2017), CPT can be used for detailed within-case empirical analysis of how causal processes play out in actual cases (Reykers & Beach, 2017). The main methodological insight of CPT is that it shifts the traditional analytical focus from causes and outcomes to hypothesized causal process in between such causes and outcomes. Thus, the focal point of using CPT is to find and investigate causal mechanism in institutional settings, particularly to investigate how the mechanisms may explain an institutional outcome of research interest.

Kay and Baker offer a broad definition of causal mechanisms, defining them as “Ultimately, unobservable physical social or psychological processes through which agents with causal capacities work, but only in specific contexts or conditions, to transfer energy, information, or matter to other entities. In doing so, the causal agent changes the affected entities characteristics, capacities, propensities, and ways that persist until later causal mechanisms act upon them” (Kay & Baker, 2015, p. 7). More succinctly, Beach (2013) discusses that a well-known definition of a causal mechanism is: A series of intervening variables through which an explanatory variable exerts a causal effect on an outcome variable (Beach, 2013, p. 13). Taking these definitions together, causal mechanisms can be formulated as an independent variable (X) causing dependent variable (Y) through the interaction of several intervening causal mechanisms (X_N):

$$(X) \rightarrow X_1, X_2, X_3, X_4, \text{ etc.} \rightarrow (Y)$$

where (X), the independent variable, is the hypothesized cause of the policy outcome associated with an outcome, dependent variable (Y); and further where the intervening causal mechanisms X_1, X_2, X_3, X_4 , and so forth, inter-operate between (X) and (Y) to cause outcome (Y). Thus, CPT, research focuses on theorizing potential causal mechanisms and, using data collected from case studies or other qualitative methods, empirically testing whether the theorized causal mechanisms interact to explain how cause (X) results in outcome (Y) (Kay & Baker, 2015).

There are three general steps used to apply CPT. First, the researcher hypothesizes a series of causal mechanisms (X_N) linked in a causal chain between an independent variable (X) and an outcome, dependent variable (Y). Second, empirical evidence is collected to test the

causal mechanisms. This evidence is referred to as Causal Process Observations (CPOs). Third, using the CPOs, the researcher evaluates whether the CPOs, together, caused of the policy outcome associated with dependent variable Y. Raveling (2012) discusses how this three-step variant of CPT is known as pattern matching CPT because the researcher tries to match the hypothesized sequence of causal mechanisms to the observed pattern of mechanisms (Rohlfing, 2013).

CPT can be used for case studies that rely on historical institutionalism (Hall, 2013). Bennett (2006) discusses how the comparative case study and CPT methods are useful for researching causal complexity (Bennett & Elman, 2006). He explains that policy systems show a variety of complexity phenomena such as path dependence, feedback loops, and interaction effects. Mahoney (2006) argues that the case study method and CPT are suitable for analyzing path dependence. Mahoney concludes that comparative case studies and CPT are valuable for “providing a clear understanding of the causal mechanisms that lie behind the creation and reproduction of institutions and the interactions among these mechanisms that lead to either locking or breakdown of these institutions” (Mahoney & Goertz, 2006, p. 252). Thus, CPT offers a suitable research method to use with the concepts of historical institutionalism.

Kay and Baker (2015) summarize the three types of CPT found in the literature. One type is theory-centric CPT, which focuses on testing a theory. Theory-centric CPT is used to test existing theory and related hypothesized causal mechanisms by investigating whether a hypothesized causal mechanism is present and work as expected. The second type of CPT aims at theory building. If there is empirical evidence of a causal relationship between a cause and an outcome in a case, this variant of CPT can be used to investigate what causal mechanisms might

explain the connection. The third type of CPT is case-centric and tries to examine what causal mechanisms explain an outcome in a particular case.

Although any of these three types of CPT might be useful for future research of the DoD OT program, the third type—case-centric CPT—may be the most helpful to use in tandem with the potential causal mechanisms identified in this study. The case study literature supports this idea. Mahoney (2006), for example, discusses optimizing case selection to study an outcome variable (Y), where (Y) can have either a positive (1) or negative (0) value. For example, for OT case selection, an outcome variable could be an OT award where a positive value (1) would be the OT was awarded, and a null value (0) would be the OT was not awarded. Mahoney discusses how two potential causal mechanisms (X_1 , X_2) could be hypothesized—here, for instance, using potential causal mechanisms from this study as X_1 and X_2 . A positive value (1) would be the potential causal mechanisms was present, and a null value would be the potential causal mechanism was not present. The potential matrix of OT cases is shown in the following Table.

Table 38. Case Selection Matrix for the DoD OT Program

Dependent variable Y: (OT award)	Causal Mechanism X_1^*	Causal Mechanism X_2^*
Y = 1 (OT awarded)	1 0 1 0	1 1 0 0
Y = 0 (OT not awarded)	1 0 1 0	1 1 0 0

Source: Table adapted from Mahoney (2006).

* 1 = causal mechanism present; 0 = causal mechanism not present.

Mahoney explains that in the typical small-n case study, there are few cases of 1 on the dependent variable, (Y). Not so for the DoD OT program where cases of 1 on the dependent variable can readily be found. For instance, the OT cases studies presented in Chapter 2 were both selected because they had a value of $Y = 1$, namely, the OTs were awarded. Mahoney recommends that positive cases—those with values (1, 1, 1) in Table 38 above—are good cases to select as case studies because they can confirm a causal theory based on theorizing that X_1 and X_2 are present in the case and interact to cause $Y = 1$. In the DoD OT program, for example, a useful (1, 1, 1) OT to investigate might be one that was awarded ($Y = 1$), and where the researcher hypothesizes that causal mechanisms X_1 and X_2 were present and acted together to cause the OT award.

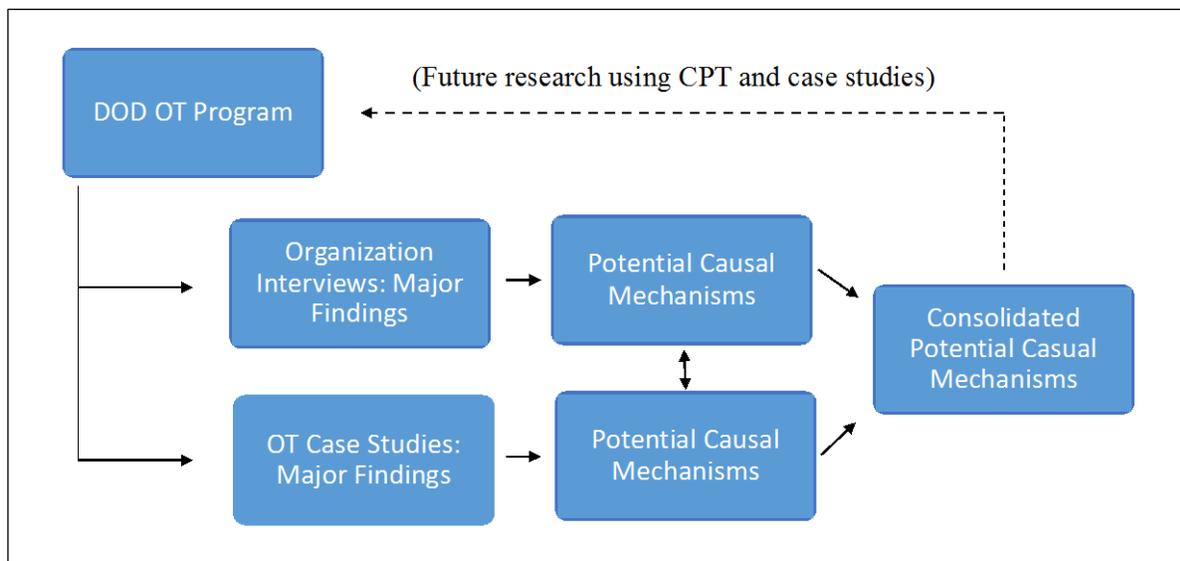
From the lower half of Table 38 above, Mahoney suggests that negative cases—(0, 1, 1) in Table 38 above—are useful to use as case studies because they can dis-confirm or at least caution against a theorized outcome based on causal action by X_1 and X_2 . In the DoD OT program, for example, a useful (0, 1, 1) OT to investigate might be one where potential causal mechanisms X_1 and X_2 were present or hypothesized to be present, yet where the OT was not awarded. Negative cases (0, 0, 1) and (0, 1, 0) may help show that potential causal mechanism X_1 and X_2 did not cause an OT not to be awarded.

The DoD OT program, with its wide range of DoD organizations and its increasing numbers and types of OTs, offers future researchers the ability to select cases that fall under any combination of the variables in Table 38 above. Using Mahoney's method above to choose OTs,

a future researcher could investigate what causal mechanisms explain an outcome in a single DoD OT case study or by comparing outcomes in several OTs.

Thus, a future researcher could use the potential causal mechanisms identified in this study as a starting point to hypothesize causal mechanisms believed to explain the outcome in a future OT case study. Using empirically derived CPOs, the researcher would then try to confirm or dis-confirm that the hypothesized potential causal mechanisms from this study actually together caused the OT outcome of interest in a future case study. The following Figure illustrates how future research could use the consolidated potential causal mechanisms from this study and CPT to support future case studies of the DoD OT program.

Figure 18. Future Research of the DoD OT Program Using the Potential Causal Mechanisms



Source: Author.

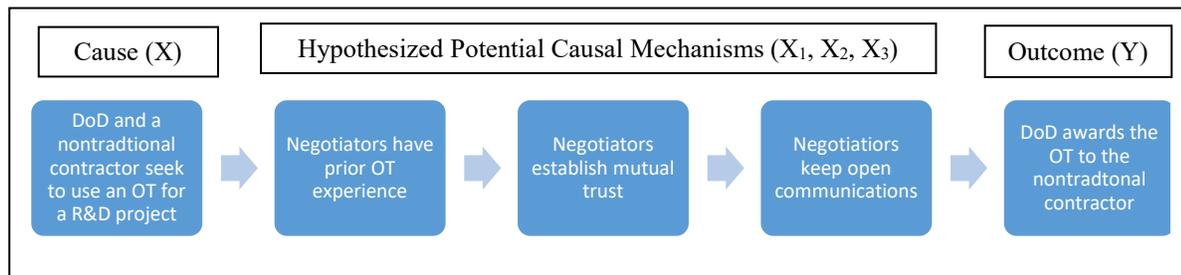
As the Figure above illustrates, the consolidated potential causal mechanisms from this study offer future researchers a convenient set of causal mechanisms they can use to investigate other research questions about the DoD OT program. The following are two examples of how a

future researcher might use case-centric CPT to investigate two unsolved policy problems in the DoD OT program.

In the first example, a future researcher might be interested in investigating the unresolved policy problem of why does DoD does not award more OTs to nontraditional contractors. This problem is discussed in the prior OT literature but remains unsolved (GAO, 2000; Bloch, 2002; Fike, 2009; Halchin, 2011). The problem is relevant to DoD policymaker because attracting nontraditional contractors to work with DoD has long been a goal of the OT statute and DoD policy efforts.

To investigate the first policy problem using CPT, the future researcher might hypothesize what factors (mechanisms) cause an OT to be successfully negotiated and awarded to a nontraditional contractor. The researcher could use consolidated mechanisms from this study as a starting point. For example, consolidated potential mechanisms from Conceptual Framework Category 1 in Appendix HH could be used as a starting point to theorize mechanisms that explain the hypothesized outcome—awarding an OT to a nontraditional contractor. The future researcher could select a case where the potential causal mechanisms were present, and the OT was successfully negotiated and awarded—(1, 1, 1) in Table 38 above—or select a case where the theorized causal mechanisms were present but the OT was not successfully negotiated and awarded—(0, 1, 1) in Table 38 above. The following Figure illustrates using CPT for an OT case study theorizing three consolidated potential causal mechanisms from Conceptual Framework Category 1 of this study (X_1, X_2, X_3), and where the outcome (Y) was that the theorized causal mechanisms were present and the OT was successfully negotiated and awarded—(1, 1, 1) in Table 38 above.

Figure 19. Example of Using CPT for Investigating an OT Award to a Nontraditional Contractor



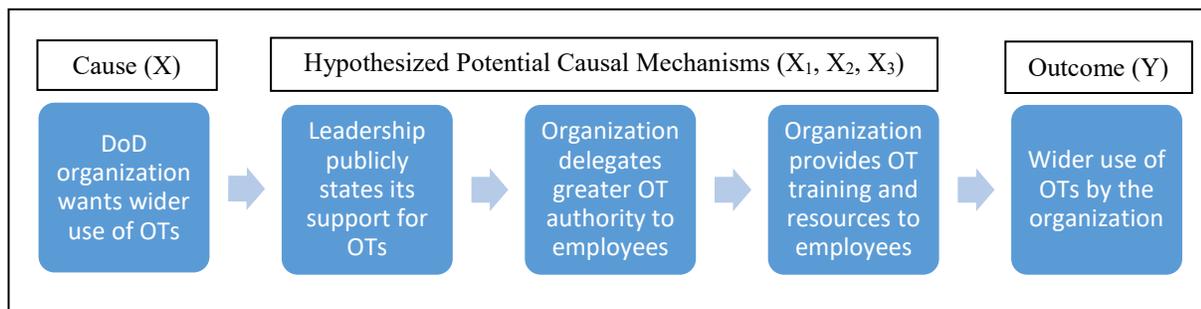
Sources: Format adapted from Kay and Baker (2015) and Pederson (2016).

As illustrated in the Figure above, as a starting point, during field research, the future researcher would investigate whether the hypothesized potential causal mechanisms (X_1 , X_2 , X_3 from this study) were present and might explain outcome (Y) in the future OT case study. So, the future researcher would use CPT and potential causal mechanisms from this study to hypothesize why an OTs was successfully (or unsuccessfully) negotiated and awarded to a nontraditional contractor in a future OT case study. The researcher would conduct field research and gather CPOs to confirm whether the mechanisms caused the OT be awarded.

In the second example, a future researcher might be interested in focusing research on another unsolved policy problem of the DoD OT program, why do some DoD organizations use OTs more widely than others? OT use varies widely across similarly situated DoD organization, promoting speculation about why one DoD organization uses OTs more widely than another. For example, why does the Army's Picatinny Arsenal use OTs more widely than venerable Navy organizations such as ONR and SPAWAR? Why does TARDEC use OTs more widely than a technology leading organization such as MDA? This problem is discussed in the prior OT literature addressing DoD institutional culture but has resisted solution (Sumption, 1999; Dunn, 2009; Stevens, 2016; Dunn, 2017).

To investigate the second problem using CPT, the future researcher might hypothesize what factors cause OTs to be more widely awarded at a DoD organization—(1, 1, 1) in Table 38 above. Consolidated potential mechanisms from this study—for instance, from Conceptual Framework Category 5 in Appendix HH—could be used as a starting point to hypothesize this outcome. The future researcher could select a case where the potential causal mechanisms were present and where wider organizational use of OTs resulted—(1, 1, 1) in Table 38 above—or a case where the mechanisms were present but wider organizational use of OTs did not occur—(0, 1, 1) in Table 38 above. The following Figure illustrates using CPT for a case study with three consolidated potential causal mechanisms (X_1, X_2, X_3) from Conceptual Framework Category 5 of this study, and where the outcome (Y) was wider organizational use of OTs occurred—(1, 1, 1) in Table 38 above.

Figure 20. Example of Using CPT for Investigating Wider Use of OTs by a DoD Organization



Sources: Format adapted from Kay and Baker (2015) and Pederson (2016).

As illustrated in the Figure above, during field research, the future researcher would investigate whether the hypothesized potential causal mechanisms (X_1, X_2, X_3 from this study) were present and might explain outcome (Y) in the future case. So, the future researcher would use CPT and consolidated potential causal mechanism from this study as a starting point to

hypothesize why a selected DoD organization more (or less) widely uses OTs in the future case study.

These examples illustrate that CPT offers future researchers with a methodological tool to unpack the causal mechanisms that may contribute to longstanding policy issues in the DoD OT program. While a future researcher may find that one or several potential causal mechanisms do not contribute to the DoD OT program outcome being investigated, this study has shown that these causal mechanisms nevertheless offer interesting insights into why DoD has not used OTs more widely. Therefore, the study has tried to help future research by providing a set of consolidated potential causal mechanisms that offer a starting point for applying CPT and additional case studies to investigate unresolved policy problems in the DoD OT program.

Recommendations

Bloomberg (2012) discusses that research recommendations are applications of research conclusions. Bloomberg recommends revisiting the significance of the study as a preliminary step to preparing the recommendations, and that the recommendations should be aligned with the study's significance. To recap, as discussed in rationale and significance sections in Chapter 1, the study is motivated by the researcher's professional interest in public procurement. The researcher believed the study is important for several for several reasons.

First, a better understanding of how DoD organizations use OTs may contribute to the wider use of OTs by DoD organizations. Second, a better understanding of the institutional factors that impact use of OTs from one DoD organization to another, or within a DoD organization, may contribute to the wider use of OTs by DoD. Third, a better understanding of

what factors influence use of OTs across DoD organizations may help DoD gain access to more innovative technologies. This could lead to improved technology outcomes for national defense.

The significance of the study is that it might offer fresh insights on an enduring DoD policy problem, what factors have prevented the wider use of OTs by DoD? The recommendations discussed below align with the significance of the study.

According to Bloomberg, the most crucial requirement for study recommendations is that they must be practical, meaning capable of implementation. Thus, the researcher tries to offer recommendations that are actionable, meaning recommendations that are capable of being implemented at low cost, using existing resources. Bloomberg discusses that the recommendations can include suggestions for further research, including suggesting next step studies designed to investigate another dimension of the study's research problem. Thus, the six policy recommendations below are followed by a seventh recommendation proposing future research of the DoD OT program using CPT. Several unsolved research questions about the DoD OT program are outlined for future researchers to consider. The recommendations follow the sequence of the conclusions discussed above and are based on the consolidated major findings, analysis, interpretation and synthesis of these findings, and are supported by the prior literature topics and the researcher's professional experience. The study's six policy recommendations below are for:

1. Establishing a knowledge management resources website for OTs.
2. Providing OT checklists and templates to employees.
3. Updating OT policies and recommendations.
4. Making FPDS mandatory to record unclassified OT awards.

5. Updating contracting officer and program management core certification standards and delegating OT authority to Level 3 certified program managers.
6. Establishing an interagency OT working group.

A seventh recommendation is for offered for conducting future research of the DoD OT program using CPT and the potential causal mechanisms from the study.

Recommendation for establishing a knowledge management resources website for OTs

DoD should consider:

Establishing a knowledge management resources website for OTs. The website should be publicly accessible by DoD employees and by contractors. The site should include OT education and training resources—for example, OT tutorials, best practices, templates, sample clauses, and checklists—to help employees and contractors negotiate and administer OTs. The website could be managed by a DoD organization such as DAU or by a contractor, for instance, a consortium OT management firm or a FFRDC.

Recommendation for providing OT checklists and templates to DoD employees and contractors

DoD should consider:

Providing policy guidance and knowledge management tools to employees and contractors—including OT checklists and OT templates—as part of its knowledge management resources website for OTs. These checklists should include a list of what laws and regulations apply to OTs. Generic templates should be provided for the most common types of OTs, including fixed-fee, cost sharing, and consortia OTs.

Recommendation for mandatory use of FPDS to record unclassified OT awards and using FPDS data to develop quantitative metrics for assessing the DoD OT program

DoD should consider:

Update existing regulations to make use of FPDS mandatory for recording all unclassified OT awards, including OT projects awarded under consortium OTs. Amend DFARS 204.606 and DPAP FPDS policy to carry out this change. FPDS data should be used to develop quantitative metrics for assessing the success of the DoD OT program. For instance, the numbers and types of follow-on production contracts could be a useful metric.

Recommendation for updating OT policies and regulations

DoD should consider:

Updating existing procurement regulations, policies and guidance to show strong DoD leadership support for OTs. For example, a policy statement from the (USD)(A&S) in an updated version of BBP 3.0 could show such strong support for OTs. Updated policies should give DoD organizations and employees more independence and authority to use OTs. Following the requirements of the NDAA for fiscal year 2018, the updated policies should establish appropriate circumstances where there is a preference for using OTs. Recommended policies and guidance to update to show DoD leadership support for OTs include:

- 32 C.F.R. Part 3—update these DoD OT regulations to reflect the current OT statute.
- DFARS Part 235—amend this regulation to establish appropriate circumstances where there is a preference for using OTs.
- DoDI 5000.02—update Section 5 (Procedures) and Enclosure 2 (Program Management Responsibilities) to integrate OTs into this major DoD program management lifecycle policy.
- The Defense Acquisition Guidebook—update Chapter 1, Section 1-4 (Additional Planning Considerations) to integrate OTs into this important DoD program management guidance.
- BBP 3.0—reissue the cover memo and update the practice area entitled, “Incentivize Innovation in Industry and Government.”
- DoD OT Guide—update the preamble (History) and Chapter 1.

Recommendation for updating contracting officer and program management core certification standards to include OT training and experience requirements; delegating OT authority to level 3 certified program managers

DoD should consider:

Updating and expanding its existing DAU contracting officer and program management core certification standards to include OT training and experience requirements. These changes can be carried out by DAU in coordination with DPAP to satisfy the OT training and education requirements in the NDAA for fiscal year 2018 and to help achieve the acquisition workforce professionalism core initiatives of BBP 3.0. DoD should consider delegating OT authority to Level 3 certified program managers. These program managers may exercise their delegated OT authority under the oversight of their local Senior Procurement Executive (SPE), Head of Contracting Activity (HCA), PARC or other designated DoD procurement official. DPAP can update the DoD OT Guide to implement this change.

Recommendation for establishing an interagency OT working group

DoD should consider:

Establishing an interagency working group to share OT best practices with other federal agencies that have OT authority. The working group could share best practices about other innovative contracting processes.

Recommendation for conducting future research of the DoD OT program

The researcher recommends that additional research should be conducted to gain a more comprehensive understanding of what institutional factors may impact how widely DoD organizations use OTs. The discussion above provides examples of how CPT and case studies could investigate specific unsolved policy issues in the DoD OT program. Other potential research questions that merit future research could include:

- What institutional factors explain the success of consortium OTs such as the DOTC OT?
- What institutional factors explain that most OTs are awarded to traditional contractors versus nontraditional contractors?
- What institutional factors contribute to some innovative industry sectors—for instance, the biotechnology sector—apparently being awarded fewer OTs than other industry sectors?
- What institutional factors impact the award of follow-on production contracts from prior competitively awarded OTs?

Future investigation of these research questions could provide deeper insights into why DoD has not more widely used OTs and the implications this has for developing and delivering advanced technologies for defense requirements.

Researcher's Final Reflections

This study provided an answer to a research question about what institutional factors may impact how widely DoD organizations use OTs. The goal of the study was to contribute to the prior literature and to offer policy recommendations that may encourage more extensive DoD use of OTs. The policy recommendations discussed above are meant to meet that goal. The researcher used a pragmatist epistemological approach to investigating the research question, meaning he tried to use available resources to infer an answer the research question. The researcher tried to minimize interjecting his personal and professional biases into the study.

The study's research design was flexible and evolved based on insights learned as the research progressed. Based on its exploratory nature, the study used qualitative research methods. Historical institutionalism was used to sharpen the theoretical focus on the research question. The study used a two-part research design comprising qualitative interviews triangulated by case studies. By applying these methodological and theoretical tools, the researcher hopes that the study may contribute to the prior literature and to the success of the DoD OT program.

The future research recommended above outlines additional research that could leverage the study's potential causal mechanisms and CPT to investigate unresolved policy questions about the DoD OT program. The historical institutionalism literature offers useful theoretical insights for researchers to apply in such future research of the DoD OT program.

During the study, the researcher was privileged to interview several dozen DoD civilian employees, military members, and contractors that support the DoD OT program. These participants provided the insights and opinions that led to the conclusions and recommendations

discussed above. The participants—hard-working employees and contractors across the nation—gave their time and expertise to share their thoughts and experiences with the researcher. Without their help and encouragement, the study would not have been possible.

The researcher learned a great deal from listening to the participants, including that they share a deep commitment to ensuring that DoD has access to the latest innovative technologies. The participants repeatedly pointed to OTs as one of the most promising tools that DoD has available to gain access to these critical advanced technologies for national defense.

A strategic objective of the National Defense Strategy is to reform DoD for greater performance and affordability (DOD(NDS), 2018, p. 10). As part of achieving this objective, the Strategy commits DoD to increase its use of prototyping and experimentation to define defense requirements:

Success no longer goes to the country that develops a new technology first, but rather to one that better integrates it and adapts its way of fighting . . . Prototyping and experimentation should be used prior to defining requirements and commercial-off-the-shelf systems . . . This approach, a major departure from previous practice and culture, will allow the Department to more quickly respond to changes in the security environment and make it harder for competitors to offset our systems (DOD(NDS), 2018, pp. 10-11).

OTs are a useful tool to assist DoD organizations achieve this approach to prototyping and experimentation. By more widely using OTs, DoD organizations can more effectively field advanced technology capabilities for defense requirements. Therefore, OTs can help DoD organizations deliver performance at the speed of relevance.

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Appendices

Appendix A. Definitions of DoD Procurement Terms

Agreements officer: Agreements officer—An individual with authority to enter into, administer, or terminate OTs. To be eligible to be an agreements officer, the individual must be a warranted DoD contracting officer with a comparable dollar value warrant.

Cost share: The amount of non-federal funding contributed to an OT project by a traditional or nontraditional contractor. Traditional contractors must contribute a cost share of at least 1/3 of the overall cost of the prototype project if no nontraditional contractors are part of the OT.

DoD organizations: The Army, Navy and Marine Corps, Air Force, Defense Agencies and other DoD organizations with authority to award OTs.

Nontraditional contractor: An entity that is not currently performing and has not performed, for at least the one-year period preceding the solicitation of sources by DoD for the procurement or transaction, any contract or subcontract for the DoD with a value of more than \$7,500,000 or a small business. A typical nontraditional contractor is a high-tech startup company from Silicon Valley or the like.

Other Transactions Agreement (OT): An agreement between a DoD organization that has delegated authority to award OTs and one or more traditional and nontraditional contractors to

develop a prototype. OT is defined in the negative; an OT is an agreement that is not a traditional procurement agreement (see definition of nontraditional procurement agreement).

Prototype project: An OT project that is directly relevant to enhancing the mission effectiveness of military personnel and the supporting platforms, systems, components, or materials proposed to be acquired or developed by DoD, or to the improvement of platforms, systems, components, or materials in use by the armed forces. A typical prototype project concerns developing or building something that has never been done before, for instance, an effective Ebola vaccine.

Small business: An entity that is independently owned and operated, not dominant in its field, and whose size falls within the size standards established by the Small Business Administration. The Small Business Administration counts companies with as much as \$35.5 million in sales and 1,500 employees as small businesses, depending on the industry.

Traditional contractor: A contractor other than a nontraditional contractor. A traditional contractor is a large defense contractor such as Boeing or Lockheed Martin.

Traditional Procurement Agreement (TPA): A DoD contract, grant or cooperative agreement. An example of a traditional procurement agreement is the ongoing DoD contract to purchase the F-35 Lightning II Joint Strike Fighter from Lockheed Martin.

Sources: 10 U.S.C. § 2371b; 10 U.S.C. § 2302; 15 U.S.C. § 632; DoD OT Guide (2017).

Appendix B. Sample OT

AGREEMENT NUMBER: HR0011-11-9-0006

AGREEMENT

BETWEEN

BLACKBOX BIOMETRICS, INC
125 TECH PARK DRIVE
ROCHESTER, NY 14623-2446

AND

THE DEFENSE ADVANCED RESEARCH PROJECTS AGENCY
3701 NORTH FAIRFAX DRIVE
ARLINGTON, VA 22203-1714

CONCERNING

BLAST GAUGE FIELD RESEARCH STUDIES

Agreement No.: HR0011-11-9-0006
ARPA Order No.: 7806/00-03
Total Amount of the Agreement: \$3,844,904
Funds Obligated: \$3,844,904
Authority: 10 U.S.C. § 2371 and Section 845, National Defense Authorization Act for Fiscal Year 1994, as amended.

Line/s of appropriation – See Article V.

This Agreement is entered into between the United States of America, hereinafter called the Government, represented by The Defense Advanced Research Projects Agency (DARPA), and Blackbox Biometrics, Inc. pursuant to and under U.S. Federal law.

FOR BLACKBOX BIOMETRICS, INC.



David Borkholder
Chief Technology Officer

(Date)

FOR THE UNITED STATES OF AMERICA
THE DEFENSE ADVANCED RESEARCH
PROJECTS AGENCY

Michael D. Blackstone
Agreements Officer

(Date)

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ATTACHMENTS

ATTACHMENT 1	Task Description Document
ATTACHMENT 2	Report Requirements
ATTACHMENT 3	Schedule of Payments and Payable Milestones
ATTACHMENT 4	Funding Schedule

ARTICLE I: SCOPE OF THE AGREEMENT

A. Background

This program aims to address a critical need for measurement of blast exposure in combat troops for correlation to resulting blast traumatic brain injury (bTBI). A low cost, disposable blast gauge will measure both pressure transients and resulting head acceleration due to explosive blast. Units will be delivered in quantities sufficient for a Brigade level pilot research study to validate device performance, refine distribution and recovery logistics, and evaluate wear ability of the device. The Performer will collaborate on a successful pilot, integrating changes to the device required for performance and optimized deployment. Systems for effective supply chain

management and quality will be developed to support future high-volume manufacturing of the blast gauges to meet the Department of Defense (DoD) need.

Currently available and emerging systems aim to achieve the same objectives, but in a non-disposable, expensive, and larger form factor. Field tests have failed to provide confidence these systems offer solutions amenable to wide distribution and accurate capture of blast pressure and acceleration waveforms. This failure has resulted in a continued lack of measurement capability on soldiers at risk of exposure. There exists a need for an ultra-small / lightweight sensor platform which allows for continuous detection of rapid pressure changes and acceleration associated with bTBI. This device will ultimately streamline triage of soldier injuries allowing appropriate application of medical resources to soldiers with mild to moderate bTBI. The proposed program will fill this critical technology gap, allowing wide distribution of data logging capabilities so a robust database of blast exposures and resulting TBI may be generated. This is a critical first step in effective medical management of blast traumatic brain injury in the warfighter.

Developing and refining this technology requires a strong collaborative effort between the DoD and the Performer. Initial prototypes, developed under a previous phase of the program (Contract No. HR001110-C-0095, Rochester Institute of Technology), have demonstrated proof of concept, but further prototypes provided in higher volumes are required to fully validate this approach. The Government is a required partner for this effort to ensure activation and recovery logistics requirements are fully supported in the delivered prototypes, and to independently evaluate performance. Additionally, the trigger thresholds and criteria for the field status indicators require input from the military medical community which can be provided through this collaborative effort. If successful, this program will result in a blast gauge system which meets DoD needs for wide dissemination to deployed troops. It will provide critical data for triage and to guide medical treatment of bTBI, with the potential to significantly reduce functional deficits and associated costs for the injured soldier.

Issues of particular importance to the issuing agency include unit cost, activation and recovery logistics, low false positive and false negative rates, soldier acceptance, and lifetime of the device. The systems developed under this program will position the Performer to deliver blast gauges in sufficient volumes to significantly reduce unit costs. The collaborative arrangement with the Rapid Equipping Force (REF) will ensure the device is optimized to streamline activation and recovery logistics. The wide deployment of blast gauge units, coupled with Performer data review and trigger algorithm modifications will result in a system with low false trigger rates. Improvements in device lifetime are not explicitly part of this Program, however the inherent expansion of engineering staff will permit exploration of design modifications to extend unit operational life in future device generations. Since the blast gauge is a disposable, all such future improvements can be seamlessly distributed without complicated field upgrade logistics. The potential DoD market is up to 200,000 units per month at the current 30-day unit lifetime. Allied international forces offer market expansion opportunities with the same device design.

The Performer plans to expand sales to international markets (e.g. NATO) and to other government personnel at risk of exposure to explosive blast such as homeland security, fire and

police agencies. The program may also drive commercial development of inexpensive, low power, high-g accelerometers which can be leveraged for commercial / sports applications in systems for logging impact accelerations associated with concussion and impact TBI. Commercial markets for concussive impact in sports will also be pursued through new designs and form factors. The overarching commercialization goal is diversification to provide a robust revenue stream with reduced susceptibility to single customer cyclic demand. This approach will enhance the Performer's ability to meet DoD need for blast gauges through significant expansion and contraction of active forces based on the changing scope of military engagements.

This program will position the Performer to deliver a blast gauge system meeting DoD needs and providing a capability to log soldier exposure to explosive blast. The system will ultimately improve the ability of medical personnel to effectively triage and treat soldiers suffering from blast traumatic brain injury. If successful, the Performer will have systems and processes established to immediately begin delivery of units at volumes ramping to over 200,000/month, if required.

B. Definitions

In this Agreement, the following definitions apply:

Agreement: The body of this Agreement and Attachments 1 – 4, which are expressly incorporated in and made a part of the Agreement.

Blast Gauge (Prototype): A low cost, disposable sensor system platform capable of measuring and logging both pressure transients and resulting head acceleration from explosive blast exposure, which is small enough for unobtrusive helmet mounting, inexpensive enough to be disposable, and robust enough for use in the field of operations. The Prototype (including items, components, processes, technical data and software) was developed or delivered under Contract No. HR0011-10-C-0095 between DARPA and Rochester Institutes of Technology, and/or disclosed in patents filed for subjection inventions conceived or first reduced to practice under contract HR0011-10-C-0095 (those known at the time of award are listed below).

11-07 – US No. 61/446,382 “Disposable Blast 11-07 – US No. 61/446,382 “Disposable Blast Dosimeter Device” Borkholder, Kovacs (DARPA), and Rogers (DARPA) Note DARPA Co-inventors)

11-08- US No. 61/446,376 “Hardware and Software Architectures for Dosimetry” Borkholder, DeBusschere

11-09- US No. 61/446,369 “Dosimetry Assemblies and Methods Thereof”, Borkholder, Fassler, Blair, Sherman.

The Blast Gauge is the subject invention conceived or first actually reduced to practice in the performance of work under Contract No. HR0011-10-C-0095. As stipulated in FAR 52.227-11, included in Contract No. HR0011-10-C-0095, the Government has a nonexclusive, nontransferable, irrevocable, paid-up license to practice, or have practiced for or on its behalf,

the subject invention throughout the world. Accordingly, the Performer, in carrying out its obligations under this Agreement, is practicing the above identified subject inventions on the Government's behalf.

Data: Recorded information, regardless of form or method of recording, which includes but is not limited to, technical data, software, and trade secrets. The term does not include financial, administrative, cost, pricing or management information and does not include subject inventions, included in Article VII.

Foreign Firm or Institution: A firm or institution organized or existing under the laws of a country other than the United States, its territories, or possessions. The term includes, for purposes of this Agreement, any agency or instrumentality of a foreign government; and firms, institutions or business organizations which are owned or substantially controlled by foreign governments, firms, institutions, or individuals.

Government: The United States of America, as represented by DARPA.

Government Purpose Rights: The rights to use, duplicate, or disclose Data, in whole or in part and in any manner, for Government purposes only, and to have or permit others to do so for Government purposes only.

Invention: Any invention or discovery which is or may be patentable or otherwise protectable under Title 35 of the United States Code.

Know-How: All information including, but not limited to discoveries, formulas, materials, inventions, processes, ideas, approaches, concepts, techniques, methods, software, programs, documentation, procedures, firmware, hardware, technical data, specifications, devices, apparatus and machines.

Made: Relates to any invention means the conception or first actual reduction to practice of such invention.

Performer: Blackbox Biometrics, Inc.

Practical application: To manufacture, in the case of a composition of product; to practice, in the case of a process or method, or to operate, in the case of a machine or system; and, in each case, under such conditions as to establish that the invention is capable of being utilized and that its benefits are, to the extent permitted by law or Government regulations, available to the public on reasonable terms.

Program: Research and development being conducted by the Performer, as set forth in Article I., paragraph C.

Property: Any tangible personal property other than property actually consumed during the execution of work under this Agreement. For purposes of this article, "property" does not include the deliverable prototypes which are the functional blast gauges.

Subject invention: Any invention conceived or first actually reduced to practice in the performance of work under this Agreement.

Technology: Discoveries, innovations, Know-How and inventions, whether patentable or not, including computer software, recognized under U.S. law as intellectual creations to which rights of ownership accrue, including, but not limited to, patents, trade secrets, and copyrights developed under this Agreement.

Unlimited Rights: Rights to use, duplicate, release, or disclose, Data in whole or in part, in any manner and for any purposes whatsoever, and to have or permit others to do so.

C. Authority

This Agreement is an “other transaction” pursuant to 10 U.S.C. § 2371 and Section 845, National Defense Authorization Act for Fiscal Year 1994, as amended. The principal purpose of this Agreement is to engage in a research and development program resulting in the fabrication and delivery of 45,500 Prototype Blast Gauges to support field research studies being conducted by the Government.

This Agreement is not a procurement contract and is not subject to the provisions of the Federal Acquisition Regulation (FAR) or the Department of Defense FAR Supplement (DFARS).

The Performer is a nontraditional defense contractor as defined in Section 845, National Defense Authorization Act for Fiscal Year 1994, as amended.

D. Goals / Objectives

The goals of this Agreement are to conduct research necessary to successfully fabricate and deliver 45,500 functional blast gauges within eleven (11) months of Agreement award and, for a period of one (1) year from Agreement award, provide field research support for packaging specifications, performance validation, hardware/software technical support, and enhanced reliability in collaboration with designated US military organizations.

The Performer shall be responsible for performance of the work set forth in the Task Description Document incorporated in this Agreement as Attachment 1. The Performer shall submit or otherwise provide all documentation required by Attachment 2, Report Requirements.

The Performer shall be paid a fixed amount for each Payable Milestone accomplished in accordance with the Schedule of Payments and Payable Milestones set forth in Attachment 3 and the procedures of Article V.

The Government will have continuous involvement with the Performer. The Government will obtain access to Program results and certain rights in data and patents pursuant to Articles VII and VIII. DARPA and the Performer are bound to each other by a duty of good faith in achieving the Program objectives.

Distribution Statement A (Approved for Public Release, Distribution Unlimited)

ARTICLE II: TERM

A. Term of this Agreement

The Program commences upon the date of the last signature hereon and continues for twelve (12) months thereafter. Provisions of this Agreement, which, by their express terms or by necessary implication, apply for periods of time other than specified herein, shall be given effect, notwithstanding this Article.

B. Termination Provisions

The Government may terminate this Agreement by written notice to the Performer, provided that such written notice is preceded by consultation between the Parties. The Performer may request Agreement termination by giving the Government sixty (60) days written notification of their intent to do so. If the Performer decides to request termination of this Agreement, the Government may, at its discretion, agree to terminate. The Government and the Performer should negotiate in good faith a reasonable and timely adjustment of all outstanding issues between the Parties as a result of termination. For termination action/s initiated by the Government, the negotiation will include non-cancelable commitments directly associated with the research effort being carried out under this Agreement. The Government has no obligation to pay for any milestones to the Performer, beyond the last completed Payable Milestone, if the Performer decides to terminate. The Parties expressly agree that, under no circumstances whatsoever, shall the Performer's termination liability exceed the costs it has incurred at the time of termination or shall Government's termination liability exceed the level of funds allotted to the Agreement at the time of Agreement termination. In the event of a termination of the Agreement, the Government shall have paid-up rights in Data as described in Article VIII, Data Rights. Failure of the Parties to agree to an equitable adjustment shall be resolved pursuant to Article VI, Disputes.

C. Extending the Term

The Parties may extend by mutual written agreement the term of this Agreement if research opportunities within the vision statement set forth in Article I reasonably warrant. Any extension shall be formalized through modification of the Agreement by the Agreements Officer and the Performer Administrator.

ARTICLE III: MANAGEMENT OF THE PROJECT

A. Management and Program Structure

The Performer shall be responsible for the overall technical and program management of the Program, and technical planning and execution shall remain with the Performer. The DARPA Agreements Officer's Representative, in consultation with the DARPA Program Manager, shall provide recommendations to Program developments and technical collaboration and be responsible for the review and verification of the Payable Milestones.

B. Program Management Planning Process

Program planning will consist of Program Plan with inputs and review from the Performer and DARPA management, containing the detailed schedule of research activities and payable milestones. The Program Plan will consolidate quarterly adjustments in the research schedule, including revisions/modification to prospective payable milestones. The Performer will submit periodic technical status and business status reports to DARPA, in accordance with Attachment 2 in order to update DARPA on Performer's performance under the Agreement.

Initial Program Plan. The Performer will follow the initial program plan that is contained in the Task Description Document (Attachment 1), and the Schedule of Payments and Payable Milestones Exit Criteria (Attachment 3).

Final Program Plan.

The Performer will prepare a Final Program Plan within 30 days of Agreement award reflecting any revisions/updates deemed necessary to accurately reflect program task activity, prototype deliveries and/or program milestones. The Final Program Plan will be presented and reviewed at the program kickoff which will be attended by the Performer, the DARPA Agreements Officer's Representative, the DARPA Program Manager, and other DoD personnel as deemed appropriate by the DARPA Program Manager.

The Final Program Plan provides a detailed schedule of research activities, commits the Performer to use its best efforts to meet specific performance objectives and describes the Payable Milestones. Recommendations for changes, revisions or modifications to the Agreement, which result from the program kickoff, or are deemed necessary due to the conduct of the research effort, shall be made in accordance with the provisions of Article III, paragraph C.

C. Modifications

As a result of the kickoff meeting, quarterly technical review meetings or at any time during the term of the Agreement, research progress or results may indicate that a change in the Task Description Document would be beneficial to program objectives. Recommendations for modifications, including justifications to support any changes to the Task Description Document and prospective Payable Milestones will be documented in a letter and submitted by the Performer to the DARPA AOR with a copy to the DARPA Agreements Officer. This documentation letter will detail the technical, chronological, and financial impact of the proposed modification to the research program. DARPA and the Performer shall approve any Agreement modification. The Government is not obligated to pay for additional or revised future Payable Milestones until the Schedule of Payments and Payable Milestones Exit Criteria (Attachment 3) is formally revised by the DARPA Agreements Officer and made part of this Agreement.

The DARPA Agreements Officer's Representative shall be responsible for the review and verification of any recommendations to revise or otherwise modify the Task Description Document, prospective Payable Milestones, or other proposed changes to the terms and conditions of this Agreement.

For minor or administrative Agreement modifications (e.g. changes in the paying office or appropriation data, changes to Government or the Performer's personnel identified in the Agreement, etc.) no signature is required by the Performer.

The Government will be responsible for effecting all modifications to this Agreement.

ARTICLE IV: AGREEMENT ADMINISTRATION

Unless otherwise provided in this Agreement, approvals permitted or required to be made by DARPA may be made only by the DARPA Agreements Officer. Administrative and contractual matters under this Agreement shall be referred to the following representatives of the parties:

A. Government Points of Contact:

Agreements Officer
Michael D. Blackstone
571-218-4804
michael.blackstone@darpa.mil

DARPA Program Manager
Dr. Jeffrey Rogers
571-218-4891
Jeffrey.rogers@darpa.mil

Agreement Officers Representative (AOR)
Shannon Kasa
Space and Naval Warfare Systems Command
53490 Dow Street
TS/A4
San Diego, CA 92152-5732
Phone: (619) 553-1340
Email: shannon.kasa@navy.mil

Performance of work under this Agreement shall be subject to the technical direction the above listed AOR. Such technical direction includes those instructions to the Performer necessary to accomplish the work stipulated in the attached Task Description Document. The AOR is not otherwise authorized to make any representations or commitments of any kind on behalf of the Agreements Officer or the Government. The AOR does not have the authority to alter the Performer's obligations or to change the terms and conditions of the Agreement.

Administrative Agreements Officer (AAO)
Smith Alexis
DCMA Syracuse
615 Erie Blvd.
West Suite 300
Syracuse, NY 13204-2408

Distribution Statement A (Approved for Public Release, Distribution Unlimited)

315-423-8519
Smith.alexis@dcma.mil

The Agreements Administrator will be responsible for the following administrative functions:

Coordinate with the AOR on acceptance and payment of invoices
Performing property administration, as required
Coordinate with AOR and DARPA General Counsel regarding processing of patent communications (reports, notices, etc. entered via i-Edison)
Ensuring timely submission of required reports
Executing administrative close-out procedures

B. Performer Points of Contact

Performer's Administrative/Contracting
Joseph V. Bridgeford
President
585-370-0818
joebridgeford@aol.com

Performer's Program Manager
David A. Borkholder, PhD.
Chief Technology Officer
585-402-2806
dborkholder@gmail.com

Each party may change its representatives named in this Article by written notification to the other party. The Government will affect the change as stated in Article III, subparagraph C.3. above.

ARTICLE V: OBLIGATION AND PAYMENT

A. Obligation

The Government's liability to make payments to the Performer is limited to only those funds obligated under the Agreement or by modification to the Agreement. DARPA may obligate funds to the Agreement incrementally.

If modification becomes necessary in performance of this Agreement, pursuant to Article III, paragraph B, the DARPA Agreements Officer and the Performer Administrator shall execute a revised Schedule of Payments and Payable Milestones Exit Criteria for prospective Payable Milestones consistent with the then current Program Plan.

B. Payments

The Parties agree that fixed payments will be made for the completion of Payable Milestones. These payments reflect value received by the Government toward the accomplishment of the research goals of this Agreement.

The Performer shall document the accomplishments of each Payable Milestone by submitting or otherwise providing the Payable Milestones Report required by Attachment 2, Part D. The Performer shall submit an original and one (1) copy of all invoices to the Agreements Officer for payment approval. After written verification of the accomplishment of the Payable Milestone by the DARPA Agreements Officer's Representative, and approval by the Agreements Officer, the Performer will submit their invoice through Wide Area Work Flow, as detailed in paragraph B.4. of this Article.

Limitation of Funds: In no case shall the Government's financial liability exceed the amount obligated under this Agreement.

Payments will be made by the cognizant Defense Agencies Financial Services office, as indicated below, within thirty (30) calendar days of an accepted invoice in Wide Area Workflow (WAWF). Wide Area Workflow (WAWF) is a secure web-based system for electronic invoicing, receipt and acceptance. The WAWF application enables electronic form submission of invoices, government inspection, and acceptance documents in order to support DoD's goal of moving to a paperless acquisition process. Authorized DoD users are notified of pending actions by e-mail and are presented with a collection of documents required to process the contracting or financial action. It uses Public Key Infrastructure (PKI) to electronically bind the digital signature to provide non-reputable proof that the user (electronically) signed the document with the contents. Benefits include online access and full spectrum view of document status, minimized re-keying and improving data accuracy, eliminating unmatched disbursements and making all documentation required for payment easily accessible.

The Performer is required to utilize the Wide Area Workflow system when processing invoices and receiving reports under this Agreement. The Performer shall (i) ensure an Electronic Business Point of

Contact is designated in Central Contractor Registration at <http://www.ccr.gov> and (ii) register to use WAWF-RA at the <https://wawf.eb.mil> site, within ten (10) calendar days after award of this Agreement. Step by Step procedures to register are available at the <https://wawf.eb.mil> site. The Performer is directed to use the "2-in-1" format when processing invoices.

For the Issue By DoDAAC enter HR0011.

For the Admin DoDAAC, Ship To and Service Acceptor fields, enter S3306A.

Leave the Inspect by DoDAAC, Ship From Code DoDAAC and LPO DoDAAC fields blank unless otherwise directed by the Agreements Officer or Administrative Agreements Officer. The following guidance is provided for invoicing processed under this Agreement through WAWF:

The AOR identified at Article IV "Agreement Administration" shall continue to formally inspect and accept the deliverables/payable milestones. To the maximum extent practicable, the AOR shall review the deliverable(s)/payable milestone report(s) and either: 1) provide a written notice of rejection to The Performer which includes feedback regarding deficiencies requiring correction or 2) written notice of acceptance to the Administrative Agreements Officer (AAO), DARPA PM and Agreements Officer.

Acceptance within the WAWF system shall be performed by the cognizant AAO upon receipt of a confirmation email, or other form of transmittal, from the AOR.

The Performer shall send an email notice to the AOR upon submission of an invoice in WAWF (this can be done from within WAWF).

The AAO will have WAWF forward copies of the processed acceptance to the Agreements Officer at the email address indicated at Article IV (this can be done from within WAWF).

Payments shall be made by DFAS-CO/North Entitlement Operations (HQ0337).

The Performer agrees, when entering invoices entered in WAWF to utilize the CLINs associated with each payable milestone as delineated at Attachment 3. The description of the CLIN shall include reference to the associated milestone number along with other necessary descriptive information. The Performer agrees that the Government may reject invoices not submitted in accordance with this provision.

Note for DFAS: The Agreement shall be entered into the DFAS system by CLIN – Milestone association as delineated at Attachment 3. The Agreement is to be paid out by CLIN – Milestone association. Payments shall be made using the CLIN (MS)/ACRN association as delineated at Attachment 3.

Payee Information: As identified at Central Contractor Registration.

Cage Code: 6G3L8
DUNS: 968664958
TIN: 452665095

Payments shall be made in the amounts set forth in Attachment 3, provided the DARPA Agreements Officer's Representative has verified the accomplishment of the Payable Milestones.

Financial Records and Reports:

The Performer shall maintain adequate records to account for all funding under this Agreement. Upon completion or termination of this Agreement, whichever occurs earlier, the Performer shall furnish to the Agreements Officer a copy of the Final Report required by Attachment 2, Part E.

The Comptroller General, at its discretion, shall have access to and the right to examine records of any party to the Agreement or any entity that participates in the performance of this Agreement that directly pertain to, and involve transactions relating to, the Agreement. Excepted from this requirement is any party to this Agreement or any entity that participates in the performance of the Agreement, or any subordinate element of such party or entity, that has not entered into any other agreement (contract, grant, cooperative agreement, or "other transaction")

that provides for audit access by a Government entity in the year prior to the date of the Agreement.

8. **Anti-Deficiency Act Compliance:** In accordance with 31 U.S.C. §1341 SUBTITLE II, an officer or employee of the United States Government may not make or authorize an expenditure or obligation exceeding an amount available in an appropriation or fund for the expenditure or obligation or involve the Government in a contract or obligation for the payment of money before an appropriation is made, unless authorized by law. To the extent required by this law, the Government's liability to make payments to the Performer is limited to only to those funds obligated or a modification or extension thereof to the Agreement.

C. Line of Appropriation

AA 02120102011 2040000 A22AJ 643747VREF 251B 0010068435 000000041561
0030001081 021001 \$3,740,000

AB 9710130 1833 AC1 154E 633070 000000 50620 63115F 667100 002305 033155 339718
F1ATD41195G0010000AA \$100,944

AC 9710400 1320 7806 P1720 2525 DPAC 1 5370 S12136 62716E \$3,961

ARTICLE VI: DISPUTES

A. General

The Parties shall communicate with one another in good faith and in a timely and cooperative manner when raising issues under this Article.

B. Dispute Resolution Procedures

Any disagreement, claim or dispute between DARPA and the Performer concerning questions of fact or law arising from or in connection with this Agreement, and, whether or not involving an alleged breach of this Agreement, may be raised only under this Article.

Whenever disputes, disagreements, or misunderstandings arise, the Parties shall attempt to resolve the issue(s) involved by discussion and mutual agreement as soon as practicable. In no event shall a dispute, disagreement or misunderstanding which arose more than three (3) months prior to the notification made under subparagraph B.3 of this article constitute the basis for relief under this article unless the Director of DARPA in the interests of justice waives this requirement.

Failing resolution by mutual agreement, the aggrieved Party shall document the dispute, disagreement, or misunderstanding by notifying the other Party (through the DARPA Agreements Officer or the Performer Administrator, as the case may be) in writing of the relevant facts, identify unresolved issues, and specify the clarification or remedy sought. Within five (5) working days after providing notice to the other Party, the aggrieved Party may, in

writing, request a joint decision by the DARPA Senior Procurement Executive and senior executive (no lower than President level) appointed by the Performer. The other Party shall submit a written position on the matter(s) in dispute within thirty (30) calendar days after being notified that a decision has been requested. The DARPA Senior Procurement Executive and the senior executive shall conduct a review of the matter(s) in dispute and render a decision in writing within thirty (30) calendar days of receipt of such written position. Any such joint decision is final and binding.

In the absence of a joint decision, upon written request to the Director of DARPA, made within thirty (30) calendar days of the expiration of the time for a decision under subparagraph B.3 above, the dispute shall be further reviewed. The Director of DARPA may elect to conduct this review personally or through a designee or jointly with a senior executive (no lower than President level) appointed by the Performer. Following the review, the Director of DARPA or designee will resolve the issue(s) and notify the Parties in writing. Such resolution is not subject to further administrative review and, to the extent permitted by law, shall be final and binding. Such resolution is not subject to further administrative review and shall be final and binding unless the parties elect to pursue the matter in court as allowed under subparagraph B.5 of this section.

Subject only to this article, if not satisfied with the results of completing the above process, either Party may within thirty (30) calendar days of receipt of the notice in subparagraph B.4 above pursue any right and remedy in a court of competent jurisdiction.

C. Limitation of Damages

Claims for damages of any nature whatsoever pursued under this Agreement shall be limited to direct damages only up to the aggregate amount of DARPA funding disbursed as of the time the dispute arises.

In no event shall either party be liable for claims for consequential, punitive, special and incidental damages, claims for lost profits, or other indirect damages.

ARTICLE VII: PATENT RIGHTS

A. Allocation of Principal Rights

Unless the Performer shall have notified DARPA (in accordance with subparagraph B.2 below) that the Performer does not intend to retain title, the Performer shall retain the entire right, title, and interest throughout the world to each subject invention consistent with the provisions of this Article and 35 U.S.C. § 202. With respect to any subject invention in which the Performer retains title, DARPA shall have a nonexclusive, nontransferable, irrevocable, paid-up license to practice or have practiced on behalf of the United States the subject invention throughout the world. In accordance with 35 U.S.C. 116 and FAR 52.227-11, the Government shall not be required to, directly or indirectly, pay royalties or other fees for use of the Blast Gauge.

B. Invention Disclosure, Election of Title, and Filing of Patent Application

The Performer shall disclose each subject invention to DARPA within four (4) months after the inventor discloses it in writing to his company personnel responsible for patent matters. The disclosure to DARPA shall be in the form of a written report and shall identify the Agreement under which the invention was made and the identity of the inventor(s). It shall be sufficiently complete in technical detail to convey a clear understanding to the extent known at the time of the disclosure, of the nature, purpose, operation, and the physical, chemical, biological, or electrical characteristics of the invention. The disclosure shall also identify any publication, sale, or public use of the invention and whether a manuscript describing the invention has been submitted for publication and, if so, whether it has been accepted for publication at the time of disclosure. The Performer shall also submit to DARPA an annual listing of subject inventions.

If the Performer determines that it does not intend to retain title to any such invention, the Performer shall notify DARPA, in writing, within eight (8) months of disclosure to DARPA. However, in any case where publication, sale, or public use has initiated the one (1)-year statutory period wherein valid patent protection can still be obtained in the United States, the period for such notice may be shortened by DARPA to a date that is no more than sixty (60) calendar days prior to the end of the statutory period.

The Performer shall file its initial patent application on a subject invention to which it elects to retain title within one (1) year after election of title or, if earlier, prior to the end of the statutory period wherein valid patent protection can be obtained in the United States after a publication, or sale, or public use. The Performer may elect to file patent applications in additional countries (including the European Patent Office and the Patent Cooperation Treaty) within either ten (10) months of the corresponding initial patent application or six (6) months from the date permission is granted by the Commissioner of Patents and Trademarks to file foreign patent applications, where such filing has been prohibited by a Secrecy Order.

Requests for extension of the time for disclosure election, and filing under Article VII, paragraph C, may, at the discretion of DARPA, and after considering the position of the Performer, be granted.

C. Conditions When the Government May Obtain Title

Upon DARPA's written request, the Performer shall convey title to any subject invention to DARPA under any of the following conditions:

If the Performer fails to disclose or elects not to retain title to the subject invention within the times specified in paragraph C of this Article; provided, that DARPA may only request title within sixty (60) calendar days after learning of the failure of the Performer to disclose or elect within the specified times.

In those countries in which the Performer fails to file patent applications within the times specified in paragraph C of this Article; provided, that if the Performer has filed a patent application in a country after the times specified in paragraph C of this Article, but prior to its

receipt of the written request by DARPA, the Performer shall continue to retain title in that country; or

In any country in which the Performer decides not to continue the prosecution of any application for, to pay the maintenance fees on, or defend in reexamination or opposition proceedings on, a patent on a subject invention.

D. Minimum Rights to the Performer and Protection of the Performer's Right to File

The Performer shall retain a nonexclusive, royalty-free license throughout the world in each subject invention to which the Government obtains title, except if the Performer fails to disclose the invention within the times specified in paragraph C of this Article. The Performer's license extends to the domestic (including Canada) subsidiaries and affiliates, if any, within the corporate structure of which the Performer is a party and includes the right to grant licenses of the same scope to the extent that the Performer was legally obligated to do so at the time the Agreement was awarded. The license is transferable only with the approval of DARPA, except when transferred to the successor of that part of the business to which the invention pertains. DARPA approval for license transfer shall not be unreasonably withheld.

The performer's domestic license may be revoked or modified by DARPA to the extent necessary to achieve expeditious practical application of the subject invention pursuant to an application for an exclusive license submitted consistent with appropriate provisions at 37 CFR Part 404. This license shall not be revoked in that field of use or the geographical areas in which the Performer has achieved practical application and continues to make the benefits of the invention reasonably accessible to the public. The license in any foreign country may be revoked or modified at the discretion of DARPA to the extent the Performer, its licensees, or the subsidiaries or affiliates have failed to achieve practical application in that foreign country.

Before revocation or modification of the license, DARPA shall furnish the Performer a written notice of its intention to revoke or modify the license, and the Performer shall be allowed thirty (30) calendar days (or such other time as may be authorized for good cause shown) after the notice to show cause why the license should not be revoked or modified.

E. Action to Protect the Government's Interest

The Performer agrees to execute or to have executed and promptly deliver to DARPA all instruments necessary to (i) establish or confirm the rights the Government has throughout the world in those subject inventions to which the Performer elects to retain title, and (ii) convey title to DARPA when requested under paragraph D of this Article and to enable the Government to obtain patent protection throughout the world in that subject invention.

The Performer agrees to require, by written agreement, its employees, other than clerical and non-technical employees, to disclose promptly in writing to personnel identified as responsible for the administration of patent matters and in a format suggested by the Performer each subject invention made under this Agreement in order that the Performer can comply with the disclosure provisions of paragraph C of this Article. The Performer shall instruct employees, through

employee agreements or other suitable educational programs, on the importance of reporting inventions in sufficient time to permit the filing of patent applications prior to U. S. or foreign statutory bars.

The Performer shall notify DARPA of any decisions not to continue the prosecution of a patent application, pay maintenance fees, or defend in a reexamination or opposition proceedings on a patent, in any country, not less than thirty (30) calendar days before the expiration of the response period required by the relevant patent office.

The Performer shall include, within the specification of any United States patent application and any patent issuing thereon covering a subject invention, the following statement: "This invention was made with Government support under Agreement No. HR0011-11-9-0006, awarded by DARPA. The Government has certain rights in the invention."

F. Lower Tier Agreements

The Performer shall include this Article, suitably modified, to identify the Parties, in all subcontracts or lower tier agreements, regardless of tier, for experimental, developmental, or research work.

G. Reporting on Utilization of Subject Inventions

The Performer agrees to submit, during the term of the Agreement, an annual report on the utilization of a subject invention or on efforts at obtaining such utilization that are being made by the Performer or its licensees or assignees. Such reports shall include information regarding the status of development, date of first commercial sale or use, gross royalties received by the Performer, and such other data and information as the agency may reasonably specify. The Performer also agrees to provide additional reports as may be requested by DARPA in connection with any march-in proceedings undertaken by DARPA in accordance with paragraph I of this Article. Consistent with 35 U.S.C. § 202(c)(5), DARPA agrees it shall not disclose such information to persons outside the Government without permission of the Performer.

All required reporting shall be accomplished, to the extent possible, using the i-Edison reporting website: <https://s-edison.info.nih.gov/iEdison/>. To the extent any such reporting cannot be carried out by use of i-Edison, reports and communications shall be submitted to the Agreements Officer and Administrative Agreements Officer.

H. Preference for American Industry

Notwithstanding any other provision of this clause, the Performer agrees that it shall not grant to any person the exclusive right to use or sell any subject invention in the United States or Canada unless such person agrees that any product embodying the subject invention or produced through the use of the subject invention shall be manufactured substantially in the United States or Canada. However, in individual cases, the requirements for such an agreement may be waived by DARPA upon a showing by the Performer that reasonable but unsuccessful efforts have been made to grant licenses on similar terms to potential licensees that would be likely to manufacture

substantially in the United States or that, under the circumstances, domestic manufacture is not commercially feasible.

I. March-in Rights

The Performer agrees that, with respect to any subject invention in which it has retained title, DARPA has the right to require the Performer, an assignee, or exclusive licensee of a subject invention to grant a non-exclusive license to a responsible applicant or applicants, upon terms that are reasonable under the circumstances, and if the Performer, assignee, or exclusive licensee refuses such a request, DARPA has the right to grant such a license itself, if DARPA determines that:

Such action is necessary because the Performer or assignee has not taken effective steps, consistent with the intent of this Agreement, to achieve practical application of the subject invention;

Such action is necessary to alleviate health or safety needs which are not reasonably satisfied by the Performer, assignee, or their licensees;

Such action is necessary to meet requirements for public use and such requirements are not reasonably satisfied by the Performer, assignee, or licensees; or

Such action is necessary because the agreement required by paragraph (H) of this Article has not been obtained or waived or because a licensee of the exclusive right to use or sell any subject invention in the United States is in breach of such Agreement.

J. Precedence to Prior Contract

In the event that both this Agreement and prior Contract No. HR0011-10-C-0095 apply to the same Subject Invention, the Subject Invention shall be deemed to fall under and shall be governed by, such prior contract.

ARTICLE VIII: DATA RIGHTS

A. Allocation of Principal Rights – Practical Application

The Parties agree that in consideration for Government funding, the Performer intends to reduce to practical application items, components and processes developed under this Agreement.

The Performer agrees to retain and maintain in good condition until 4 years after completion or termination of this Agreement, all Data necessary to achieve practical application. In the event of exercise of the Government's March-in Rights as set forth under Article VII, Section I, the Performer agrees, upon written request from the Government, to deliver at no additional cost to the Government, all Data necessary to achieve practical application within sixty (60) calendar days from the date of the written request. The Government shall retain Unlimited Rights, as defined in paragraph A above, to this delivered Data.

Distribution Statement A (Approved for Public Release, Distribution Unlimited)

The Performer agrees that, with respect to Data necessary to achieve practical application, DARPA has the right to require the Performer to deliver all such Data to DARPA in accordance with its reasonable directions if DARPA determines that:

Such action is necessary because the Performer or assignee has not taken effective steps, consistent with the intent of this Agreement, to achieve practical application of the technology developed during the performance of this Agreement;

Such action is necessary to alleviate health or safety needs which are not reasonably satisfied by the Performer, assignee, or their licensees; or

Such action is necessary to meet requirements for public use and such requirements are not reasonably satisfied by the Performer, assignee, or licensees.

With respect to all Data developed and/or delivered, in the event of the Government's exercise of its right under subparagraph A.2 of this article, the Government shall receive Unlimited Rights, as defined in Article I, paragraph B.

B. Allocation of Principal Rights – Practical Application

With respect to all Data developed and/or generated under the Agreement, the Government shall receive Unlimited Rights, as defined in Article I, paragraph B.

C. Marking of Data

Pursuant to paragraph A above, any Data delivered under this Agreement shall be marked with the following legend:

Use, duplication, or disclosure is subject to the restrictions as stated in Agreement HR0011-11-90006 between the Government and the Performer.

D. Lower Tier Agreements

The Performer shall include this Article, suitably modified to identify the Parties, in all subcontracts or lower tier agreements, regardless of tier, for experimental, developmental, or research work.

ARTICLE IX: FOREIGN ACCESS TO TECHNOLOGY

This Article shall remain in effect during the term of the Agreement and for three (3) years thereafter.

A. General

The Parties agree that research findings and technology developments arising under this Agreement may constitute a significant enhancement to the national defense, and to the economic vitality of the United States. Accordingly, access to important technology developments under this Agreement by Foreign Firms or Institutions must be carefully controlled. The controls contemplated in this Article are in addition to, and are not intended to change or supersede, the provisions of the International Traffic in Arms Regulation (22 CFR pt. 121 et seq.), the DoD Industrial Security Regulation (DoD 5220.22-R) and the Department of Commerce Export Regulation (15 CFR pt. 770 et seq.)

B. Restrictions on Sale or Transfer of Technology to Foreign Firms or Institutions

In order to promote the national security interests of the United States and to effectuate the policies that underlie the regulations cited above, the procedures stated in subparagraphs B.2, B.3, and B.4 below shall apply to any transfer of Technology. For purposes of this paragraph, a transfer includes a sale of the company, and sales or licensing of Technology. Transfers do not include:

sales of products or components, or

licenses of software or documentation related to sales of products or components, or

transfer to foreign subsidiaries of the Performer for purposes related to this Agreement, or

transfer which provides access to Technology to a Foreign Firm or Institution which is an approved source of supply or source for the conduct of research under this Agreement provided that such transfer shall be limited to that necessary to allow the firm or institution to perform its approved role under this Agreement.

The Performer shall provide timely notice to DARPA of any proposed transfers from the Performer of Technology developed under this Agreement to Foreign Firms or Institutions. If DARPA determines that the transfer may have adverse consequences to the national security interests of the United States, the Performer, its vendors, and DARPA shall jointly endeavor to find alternatives to the proposed transfer which obviate or mitigate potential adverse consequences of the transfer but which provide substantially equivalent benefits to the Performer.

In any event, the Performer shall provide written notice to the DARPA Agreements Officer's Representative and Agreements Officer of any proposed transfer to a foreign firm or institution at least sixty (60) calendar days prior to the proposed date of transfer. Such notice shall cite this Article and shall state specifically what is to be transferred and the general terms of the transfer. Within thirty (30) calendar days of receipt of the Performer's written notification, the DARPA Agreements Officer shall advise the Performer whether it consents to the proposed transfer. In cases where DARPA does not concur or sixty (60) calendar days after receipt and

DARPA provides no decision, the Performer may utilize the procedures under Article VI, Disputes. No transfer shall take place until a decision is rendered.

In the event a transfer of Technology to Foreign Firms or Institutions which is NOT approved by DARPA takes place, the Performer shall (a) refund to DARPA funds paid for the development of the Technology and (b) the Government shall have a non-exclusive, nontransferable, irrevocable, paid-up license to practice or have practiced on behalf of the United States the Technology throughout the world for Government and any and all other purposes, particularly to effectuate the intent of this Agreement. Upon request of the Government, the Performer shall provide written confirmation of such licenses.

C. Lower Tier Agreements

The Performer shall include this Article, suitably modified, to identify the Parties, in all subcontracts or lower tier agreements, regardless of tier, for experimental, developmental, or research work.

ARTICLE X: TITLE TO AND DISPOSITION OF PROPERTY

A. Title to Property

The Performer will acquire property with an acquisition value greater than \$5,000 under this Agreement as set forth in this Agreement which is necessary to further the research and development goals of this Program and is not for the direct benefit of the Government. Title to this property shall vest in the Performer upon acquisition. Title to any other items of property acquired under this Agreement with an acquisition value of \$5,000 or less shall vest in the Performer upon acquisition with no further obligation of the Parties unless otherwise determined by the Agreements Officer. Should any other item of property with an acquisition value greater than \$5,000 be required, the Performer shall obtain prior written approval of the Agreements Officer. Title to this property shall also vest in the Performer upon acquisition. The Performer shall be responsible for the maintenance, repair, protection, and preservation of all property at its own expense.

The Performer's deliverable prototype shall not be classified as property.

B. Disposition of Property

At the completion of the term of this Agreement, items of property set forth in this Agreement or any other items of property with an acquisition value greater than \$5,000 shall be disposed of in the following manner:

- Purchased by the Performer at an agreed-upon price, the price to represent fair market value, with the proceeds of the sale being returned to DARPA; or
- Transferred to a Government research facility with title and ownership being transferred to the Government; or
- Donated to a mutually agreed University or technical learning center for research purposes; or

Any other DARPA-approved disposition procedure.

ARTICLE XI: CIVIL RIGHTS ACT

This Agreement is subject to the compliance requirements of Title VI of the Civil Rights Act of 1964 as amended (42 U.S.C. 2000-d) relating to nondiscrimination in Federally assisted programs. The Performer has signed an Assurance of Compliance with the nondiscriminatory provisions of the Act.

ARTICLE XII: SECURITY

The Government does not anticipate the need for the Performer to develop and/or handle classified information in the performance of this Agreement. No DD254 is currently required for this Agreement.

ARTICLE XIII: SUBCONTRACTORS

The Performer shall make every effort to satisfy the intent of competitive bidding of sub-agreements to the maximum extent practical. The Performer may use foreign entities or nationals as subcontractors, subject to compliance with the requirements of this Agreement and to the extent otherwise permitted by law.

ARTICLE XIV: PUBLIC RELEASE OR DISSEMINATION OF INFORMATION

There shall be no dissemination or publication, except within and between the Performer and any subcontractors, of information developed under this Agreement or contained in the reports to be furnished pursuant to this Agreement without prior written approval of the AOR. All technical reports will be given proper review by appropriate authority to determine which Distribution Statement is to be applied prior to the initial distribution of these reports by the Performer. Unclassified patent related documents are exempt from prepublication controls and this review requirement. Papers resulting from unclassified fundamental research are exempt from prepublication controls and this review requirement, pursuant to DoD Instruction 5230.27 dated October 6, 1987.

The Performer shall submit all proposed public releases for review and approval as instructed at <http://www.darpa.mil/prc/>. Public releases include press releases, specific publicity or advertisement, and publication or presentation, but exclude those relating to the open sourcing or licensing, sales or other commercial exploitation of products, services or technologies. In addition, articles for publication or presentation will contain a statement on the title page worded substantially as follows:

"This research was, in part, funded by the U.S. Government. The views expressed are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government."

ARTICLE XV: KEY PERSONNEL

A. The Performer shall notify the Agreements Officer in writing prior to making any change in key personnel. The following individuals are designated as key personnel for the purposes of this Agreement:

- Principle Investigator (PI): David A. Borkholder, PhD

B. When replacing any of the personnel identified above, the Performer must demonstrate that the qualifications of the prospective personnel are acceptable to the Government as reasonably determined by the Program Manager. Substitution of key personnel shall be documented by modification to the Agreement made in accordance with the procedures outlined in Article III, paragraph C.

ARTICLE XVI: EXPORT CONTROL

Definition. “Export-controlled items,” as used in this clause, means items subject to the Export Administration Regulations (EAR) (15 CFR Parts 730-774) or the International Traffic in Arms Regulations (ITAR) (22 CFR Parts 120-130). The term includes:

“Defense items,” defined in the Arms Export Control Act, 22 U.S.C. 2778(j)(4)(A), as defense articles, defense services, and related technical data, and further defined in the ITAR, 22 CFR Part 120.

“Items,” defined in the EAR as “commodities”, “software”, and “technology,” terms that are also defined in the EAR, 15 CFR 772.1.

The Performer shall comply with all applicable laws and regulations regarding export-controlled items, including, but not limited to, the requirement for contractors to register with the Department of State in accordance with the ITAR. The Performer shall consult with the Department of State regarding any questions relating to compliance with the ITAR and shall consult with the Department of Commerce regarding any questions relating to compliance with the EAR.

The Performer's responsibility to comply with all applicable laws and regulations regarding export-controlled items exists independent of, and is not established or limited by, the information provided by this clause.

Nothing in the terms of this contract adds, changes, supersedes, or waives any of the requirements of applicable Federal laws, Executive orders, and regulations, including but not limited to—

The Export Administration Act of 1979, as amended (50 U.S.C. App. 2401, *et seq.*);

The Arms Export Control Act (22 U.S.C. 2751, *et seq.*);

The International Emergency Economic Powers Act (50 U.S.C. 1701, *et seq.*);

The Export Administration Regulations (15 CFR Parts 730-774);

The International Traffic in Arms Regulations (22 CFR Parts 120-130); and

Executive Order 13222, as extended;

(e) The Performer shall include the substance of this clause, including this paragraph (e), in all subawards.

ARTICLE XVII: ORDER OF PRECEDENCE

Distribution Statement A (Approved for Public Release, Distribution Unlimited)

In the event of any inconsistency between the terms of this Agreement and language set forth in the Attachments, the inconsistency shall be resolved by giving precedence in the following order: (1) The Agreement, and (2) all Attachments to the Agreement.

ARTICLE XVIII: EXECUTION

This Agreement constitutes the entire agreement of the Parties and supersedes all prior and contemporaneous agreements, understandings, negotiations and discussions among the Parties, whether oral or written, with respect to the subject matter hereof. This Agreement may be revised only by written consent of the Performer and the DARPA Agreements Officer. This Agreement, or modifications thereto, may be executed in counterparts each of which shall be deemed as original, but all of which taken together shall constitute one and the same instrument.

ARTICLE XIX: APPLICABLE LAW

United States federal law will apply to the construction, interpretation, and resolution of any disputes arising out of or in connection with this Agreement.

ARTICLE XX: SEVERABILITY

In the event that any one or more of the provisions contained herein shall, for any reason, be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not impact any other provisions of this Agreement, but this Agreement shall be construed as if such invalid, illegal or unenforceable provisions had never been contained herein, unless the deletion of such provision or provisions would result in such a material change so as to cause completion of the transactions contemplated herein to be unreasonable.

ARTICLE XXI: FORCE MAJEURE

The Performer shall not be liable for delays or non-performance hereunder if such delay or nonperformance is from causes beyond the control and without the fault or negligence of the Performer or its subcontractors, and is due, directly, to fire or other casualty; act of God; strike or labor dispute; war or other violence, or to acts of the Government in either its sovereign or contractual capacity.

ATTACHMENT 1
TASK DESCRIPTION DOCUMENT

BLACKBOX BIOMETRICS, INC.
28 July 2011

BACKGROUND

Blackbox Biometrics shall provide 45,500 functional blast gauges for field research. Beyond supplying the devices Blackbox Biometrics will work with Defense Advanced Research Projects Agency (DARPA) and designate US military organizations to support field research through performance validation, addressing any problems as they are identified, and refining the packaging, software activation, and recovery of the gauges to streamline processes and enhance reliability. Reliability will include both data correctness and sensing accuracy. Blast gauge deliveries will be made in support of a 1-year research effort. Prior to delivery of the first batch of gauges, Blackbox Biometrics will detail its plans for production and risk management in the form of a supply management plan, a quality plan, and a program plan. Acceptance of these plans by DARPA will be considered the first payable milestone. Gauges will be delivered to a location within the continental United States to be defined by DARPA. Blackbox Biometrics will be responsible for associated shipping.

Phase I will focus on development of detailed supply chain management, quality, and overall program plans as detailed in tasks 1-3. Phase II effort will involve collaboration with the Rapid Equipping Force (or other) for refinements detailed in task 4. Phase III will comprise production of prototype blast gauge units to support field research as detailed in task 5.

Blast gauges produced in this effort will support 2 research studies. The primary one will use the fabricated blast gauges under the guidance of DARPA and the Rapid Equipping Force (REF) as the US Army representative. The second study using a small subset of the 45,500 blast gauges (1,000 units) will be overseen by DARPA and the Air Force Special Operations Command (AFSOC). The DARPA/REF effort will take priority in the production of blast gauges with the AFSOC effort being provided once there is excess manufacturing capacity, but not to exceed 6 months after the beginning of the DARPA/REF study.

TECHNICAL METRICS

There are no technical metrics currently identified for Phase I or II of this effort. Should technical metrics emerge as a result of Phase I and II tasks, the requirements will be documented and approved by the DARPA. In Phase III, the functional blast gauge prototypes will be designed and produced to the target specifications defined in the table below. These specifications are based on a combination of calculations and performance measurements on the prior blast gauge prototypes. Each unit will be functionally tested and calibrated for both pressure and internal clocks used for the timestamp.

Description	Performance Specification
Overpressure	100psi, 200kHz data rate, 20msec window Accuracy 1% nominal (23°C) 4.6% worst case (+70°C)
Acceleration	±16g, 3.2kHz data rate, 20msec window Peak value in 10msec window, 1 sec
Memory	> 9 event storage
Shelf life	> 5 years
Operational life after 5-year storage 16-hour activity, 8-hour inactivity each 24-hour period	30 days 23°C 26 days 49°C/0°C, 12-hour cycles 19 days -46°C/0°C, 12-hour cycles
Operational Temperature	-46°C to 71°C
Volume	15 cm ³
Weight	23 grams
Timestamp cumulative error after 30 days	5.4 min 23°C 13.4 min 49°C/0°C 12-hour cycles 3.4 hrs. -46°C/0°C 12-hour cycles

C. TASKS

Phase I – Production and Risk Management Plans

Delivery of a Supply Chain Management Plan. This plan shall include a strategy for managing all resources needed to supply properly working blast gauges for research. Milestones and quantifiable metrics for monitoring the supply chain efficiency, cost, and quality will be included. Blackbox Biometrics is the primary organization responsible for task execution. The MITA Group, Inc. will provide technical guidance on development of the plan in collaboration with President Joe Bridgeford with technical review and oversight by the PM (David Borkholder). Task completion is defined as acceptance of the plan by DARPA. Deliverable for this task is a document describing the Supply Chain Management Plan.

Delivery of a Quality Plan. This plan will include all the needed considerations to ensure quality of both the components being delivered to BlackBox Biometrics and the quality of blast gauges Blackbox provides. The plan should address quality control activities, communication of production status to DARPA, how access to the manufacturing will be given for inspections by DARPA, and the course of corrective action if gauges or the manufacturing process fail inspection. Blackbox Biometrics is the primary organization responsible for task execution. The MITA Group, Inc. will provide technical guidance on development of the plan in collaboration with President Joe Bridgeford with technical review and oversight by the PM (David Borkholder). Task completion is defined as acceptance of the plan by DARPA. Deliverable for this task is a document describing the Quality Plan.

Delivery of a Program Plan. This plan will address all necessary activities to produce the blast gauges on schedule. The plan should include financing, pricing, performance testing, addressing unforeseen performance problems identified during the pilot, updates to gauges already in the

field, and analysis of the electronic data for gauges that have been used in the pilot. Blackbox Biometrics is the primary organization responsible for task execution. Paragraph D. below will serve as the Initial Program Plan required by Article III.B.1 to be further enhanced with direction from DARPA Program Manager after award. The MITA Group, Inc. will provide technical guidance on development of the final plan in collaboration with President Joe Bridgeford and with technical review and oversight by the PM (David Borkholder). Task completion is defined as acceptance of the plan by DARPA. Deliverable for this task is a document describing the overall Program Plan.

Phase II – System Refinements

Graphical User Interface (GUI) verification and validation (V&V). The GUI developed under the original RIT contract will be modified to incorporate improvements including data transfer speed, ZULU based time stamp, automated file naming, and the ability to reprogram blast gauges. This interface will allow field activation of the gauges and data recovery until the third-party system (task 5.4) is available. BlackBox Biometrics is the primary organization responsible for task execution. GUI updates will be done by lead engineer Derek DeBusschere with V&V performed by a hardware and software services firm (Vanteon). The task will be managed by the PM (David Borkholder) with support from President Joe Bridgeford. Task completion is defined as completion of V&V and approval of the GUI by DARPA. The specific deliverable is final GUI provided to DARPA and designated US military organizations.

US Military Support. Blackbox Biometrics will refine packaging, unit marking, software activation and recovery of data from gauges to support requirements defined in collaboration with the Rapid Equipping Force (or other group designated by DARPA). Specific tasks anticipated in this support include:

Determination of appropriate physical unit marking for mounting location and optimal packaging of units (quantity per package, package style, etc.) to promote predictable soldier mounting and data correctness. Blackbox Biometrics is the primary organization responsible for task execution. Specifically, the task will be managed by the PM (David Borkholder) with support from President Joe Bridgeford. Bridgeford and Borkholder will travel to meet with the REF and will generate a marking and packaging specification. Task completion is defined as acceptance of the specification by DARPA. There are no specific deliverables to DARPA for this task.

Final manufacturing test and packaging will be modified (if required) to support embedding unique identifier and mounting location into each device, with the unique identifier (e.g. barcode) physically labeled on the packaging. Blackbox Biometrics is the primary organization responsible for task execution. Specifically, the task will be managed by President Joe Bridgeford with technical oversight provided by the PM (David Borkholder). The manufacturing test system will be modified by TBD electrical engineer with embedded code changes performed by lead engineer Derek DeBusschere. Task completion is defined as final test and packaging meeting the specifications defined in 5.1. There are no specific deliverables to DARPA for this task.

Determination of appropriate software activation and data recovery methods and plan for the pilot deployment. Blackbox Biometrics is the primary organization responsible for task execution. Specifically, the task will be managed by the PM (David Borkholder) with support from President Joe Bridgeford. Bridgeford and Borkholder will travel to meet with the REF and

will generate an activation and data recovery specification with inputs from Lead Engineer Derek DeBusschere. Task completion is defined as acceptance of the specification by DARPA. There are no specific deliverables to DARPA for this task.

Consistent with the methods and plan developed in 5.3, will support third party software development (as required) for device activation and data recovery through a USB Human Interface Device (HID) class interface with a registered unique Vendor ID and Product ID. Blackbox Biometrics will provide either specification for communication with the device, or a Windows Application Programming Interface (API) for blast gauge activation and data recovery. Embedded code modifications will be made to support any changes to the current activation and data recovery protocols. Blackbox Biometrics is the primary organization responsible for task execution. Specifically, the task will be managed by the PM (David Borkholder) with support from President Joe Bridgeford. Embedded code modifications, specifications, and/or the API creation will be performed by lead engineer Derek DeBusschere. Code testing will be done by the TBD electrical engineer. Task completion is defined as delivery of required library components to the third-party software developer and/or integration of embedded code modifications into the blast gauges. There are no specific deliverables to DARPA for this task. Support to address unforeseen performance problems identified during field research, provide embedded code updates to gauges already in the field, and analysis of the electronic data for tested gauges. Performance problems will be analyzed with mitigations proposed, approved by DARPA, and implemented including up to one PCB revision and associated engineering verification. The embedded code will be modified as required (up to three times) with the ability provided to upgrade units already shipped. Blackbox Biometrics is the primary organization responsible for task execution, to include all necessary data analysis and embedded code modifications. This task will continue to the end of the 12-month research effort. There are no specific deliverables to DARPA for this task.

Phase III – Prototype Blast Gauge Production

Delivery Milestones. Blackbox Biometrics will delivery units in 510 unit lot sizes to support a Rifle Company unit size of 150 soldiers with three units per soldier, and 60 additional units to account for loss and decommissioning following explosive blast. Lot delivery targets will be consistent with the milestones define below, with acceleration possible pending electronic component availability and the scope of required changes in manufacturing defined in task 5. Lots will be shipped weekly and payments made per the Attachment 3 Payable Milestone Plan.

Month	Number ARMY Lots Delivered (510 units per lot)	Number AF Units Delivered	Cumulative Units
3	1	0	510
4	5	0	3,060
5	6	1000	7,120
6	11	0	12,730
7	12	0	18,850

8	12	0	24,970
9	12	0	31,090
10	15	0	37,720
11	13+	0	45,500

Blackbox Biometrics is the primary organization responsible for task execution. Specifically, the task will be managed by President Joe Bridgeford with technical oversight provided by the PM (David Borkholder). Printed circuit board assemblies will be produced and tested at SenDEC Corporation with over molding performed at Cavist Corporation. Dome production and insertion, cord production and insertion, final unit test, packaging and shipment will be done at BlackBox Biometrics. Task completion is defined by delivery of each lot passing all tests defined in the accepted quality plan (task 2), culminating in cumulative delivery of 45,500 functional blast gauges. Specific deliverable to DARPA is 45,500 functional blast gauges. Post-Delivery Technical and Logistics Support

Any technical and logistics issues impacting effective use of the blast gauges in the pilot will be addressed to the extent possible by Blackbox Biometrics. Technical advising and analysis will be provided as required to discuss issues and brainstorm / implement mitigations. The PM, David Borkholder and the Lead Engineering, Derek DeBusschere will provide support coverage via phone and/or e-mail. Electronic data from gauges will be analyzed to confirm all captured internal measurements are within anticipated values. The waveform characteristics of any false triggers will be used to test new trigger algorithms for successful rejection. In cases where algorithm modifications are insufficient, hardware modifications to mitigate the false triggers will be investigated, and if practical, implemented. A means of reprogramming devices already in the field will be provided, with the specific configuration and flexibility of the system determined in collaboration with the REF or the AFSOC. Any issues relating to deployment logistics will be reviewed, solutions developed in cooperation with the REF or the AFSOC, and implementation into the code, packaging, or manufacturing as required.

Task Schedule

Task	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
1. Supply Chain Management Plan	X											
2. Quality Plan		X										
3. Program Plan	X											
4. GUI V&V	X											
5. Field Research Support	X	X	X	X	X	X	X	X	X	X	X	X
5.1 Marking and Packaging Specification	X											
5.2 Marking and Packaging Modifications		X										

5.3 Activation and Recovery Specification	X											
5.4 Software Development Support		X	X	X								
5.5 Field Support	X	X	X	X	X	X	X	X	X	X	X	X
6. Blast Gauge Delivery			X	X	X	X	X	X	X	X	X	

ATTACHMENT 2 REPORT REQUIREMENTS

A. MONTHLY REPORT

On or before thirty (30) calendar days after the effective date of the Agreement and monthly thereafter throughout the term of the Agreement, the Performer shall submit or otherwise provide a technical status report. Two (2) copies shall be submitted or otherwise provided to the DARPA Program Manager, one (1) copy shall be submitted or otherwise provided to the DARPA Agreements Officer, and one (1) copy shall be submitted or otherwise provided to DARPA/MTO, Attn: Assistant Director for Program Management. The report will detail technical progress to date and report on all problems, technical issues, major developments, and the status of external collaborations during the reporting period.

B. ANNUAL PROGRAM PLAN DOCUMENT

The Performer shall submit or otherwise provide to the DARPA Agreements Officer's Representative and DARPA Agreements Officer one (1) copy each of a report which describes the Annual Program Plan as described in Article III, Section B. This document shall be submitted not later than thirty (30) calendar days following the Annual Site Review as described in Article III, Section B.

C. SPECIAL TECHNICAL REPORTS

As agreed to by the Performer and the DARPA Agreements Officer's Representative, the Performer shall submit or otherwise provide to the DARPA Agreements Officer's Representative and DARPA Agreements Officer one (1) copy each of special reports on significant events such as significant target accomplishments by the Performer, significant tests, experiments, or symposia.

D. PAYABLE MILESTONES REPORTS

The Performer shall submit or otherwise provide to the DARPA Agreements Officer's Representative and DARPA Agreements Officer documentation describing the extent of accomplishment of Payable Milestones. This information shall be as required by Article V, paragraph B and shall be sufficient for the DARPA Agreements Officer's Representative to reasonably verify the accomplishment of the milestone of the event in accordance with the Task Description Document.

E. FINAL REPORT (NOTE: The Final Report is included in the last Payable Milestone for the completed Agreement)

The Performer shall submit or otherwise provide a Final Report making full disclosure of all major developments by the Performer upon completion of the Agreement or within sixty (60) calendar days of termination of this Agreement. With the approval of the DARPA Agreements Officer's Representative, reprints of published articles may be attached to the Final Report. Two (2) copies shall be submitted or otherwise provided to the DARPA Agreements Officer's Representative, one (1) copy shall be submitted or otherwise provided to the DARPA Agreements Officer, and one (1) copy shall be submitted or otherwise provided to DARPA/MTO, Attn: Assistant Director for Program Management. One (1) copy shall be submitted to the Defense Technical Information Center, Attn: DTIC-BCS, 8725 John J. Kingman Road, Suite 0944, Fort Belvoir, VA 22060-0944.

The Final Report shall be marked with a distribution statement to denote the extent of its availability for distribution, release, and disclosure without additional approvals or authorizations. The Final Report shall be marked on the front page in a conspicuous place with the following marking:

"DISTRIBUTION STATEMENT B. Distribution authorized to U.S. Government agencies only due to the inclusion of proprietary information and to prevent premature dissemination of potentially critical technological information. Other requests for this document shall be referred to DARPA Public Release Center (PRC) via email at PRC@darpa.mil."

F. FINAL REPORT MARKINGS

The cover or title page of each of the above reports or publications prepared, will have the following citation:

Sponsored by
Defense Advanced Research Projects Agency Microsystems Technology Office (MTO)
Program: Blast Dosimeter
Issued by DARPA/CMO under Agreement No. HR0011-11-9-0006

The title page shall include a disclaimer worded substantially as follows:

"The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the official policies, either expressly or implied, of the Defense Advanced Research Projects Agency or the U.S. Government."

The Final Report shall include a Standard Form 298, August 1998.

All reports shall be marked with the below Distribution Statement and Data Rights statements:

Distribution Statement B.

Distribution Statement A (Approved for Public Release, Distribution Unlimited)

“DISTRIBUTION STATEMENT B. Distribution authorized to U.S. Government agencies only due to the inclusion of proprietary information and to prevent premature dissemination of potentially critical technological information. Other requests for this document shall be referred to DARPA Public Release Center (PRC) via email at PRC@darpa.mil.”

Unlimited Rights.

“UNLIMITED RIGHTS

Agreement Number: HR0011-11-9-0006

Contractor Name: Blackbox Biometrics, Inc.

In accordance with Article VIII, as applicable, contained in the above identified Agreement, the Government has the right to use, duplicate, release, or disclose, Data in whole or in part, in any manner and for any purposes whatsoever, and to have or permit others to do so. Any reproduction of this Data or portions thereof marked with this legend must also reproduce the markings.”

G. EXECUTIVE SUMMARY

The Performer shall submit a one to two-page executive-level summary of the major accomplishments of the Agreement and the benefits of using the “other transactions” authority pursuant to 10 U.S.C. § 2371 and Section 845, National Defense Authorization Act for Fiscal Year 1994 upon completion of the Agreement. This summary shall include a discussion of the actual or planned benefits of the technologies for both the military and commercial sectors. Two (2) copies shall be submitted to the DARPA Agreements Officer.

ATTACHMENT 3
SCHEDULE OF PAYMENTS AND PAYABLE MILESTONES

MS #	Milestone	Due Date	Amount	CLIN	ACRN
	Title / Description				

1	<p>Supply Chain Management Plan Acceptance Criteria: Plan which includes resource management strategy, milestones and quantifiable metrics for supply chain, cost, and quality.</p> <p>Program Plan Acceptance Criteria: Plan which describes all activities required to produce blast gauges on schedule, including financing, pricing, performance testing, addressing unforeseen problems, and updates to gauges in the field, and analysis of data from gauges used in the pilot.</p>	31-Aug-11	\$24,914	0001	AA
2	<p>GUI V&V Acceptance Criteria: GUI incorporating ZULU based time stamp, automated file naming, and field reprogramming of gauges demonstrated to pass verification and validation testing performed by Vanteon.</p>	31-Aug-11	\$10,000	0002	AA
3	<p>Pilot Research and Program Support Acceptance Criteria: Performer meeting commitments for DARPA deliverables on manufacturing of prototype blast gauges, interactions with designate agencies, and support of the pilot.</p>	31-Aug-11	\$232,014	0003	AA

4	<p>Quality Plan Acceptance Criteria: Plan which includes quality control activities for both incoming components and produced blast gauges; communication of production status to DARPA; access for DARPA inspections; and planned corrective actions for inspection failure.</p> <p>Marking and Packaging Specification Acceptance Criteria: Specification defining physical unit marking and optimal packaging of units.</p>	30-Sep-11	\$37,342	0004	AA
5	<p>Pilot Research and Program Support Acceptance Criteria: Performer meeting commitments for DARPA deliverables on manufacturing of prototype blast gauges, interactions with designate agencies, and support of the pilot.</p>	30-Sep-11	\$220,577	0005	AA
6	<p>Pilot Research and Program Support Acceptance Criteria: Performer meeting commitments for DARPA deliverables on manufacturing of prototype blast gauges, interactions with designate agencies, and support of the pilot.</p>	31-Oct-11	\$278,803	0006	AA
7	<p>Blast Gauge Delivery Lot #1 (ARMY) Acceptance Criteria: Delivery of 510 blast gauges which pass all tests and quality metrics identified in the quality plan and marked and packaged according to the specification in task 5.1.</p>	31-Oct-11	\$16,812	0007	AA
8	<p>Pilot Research and Program Support Acceptance Criteria: Performer meeting commitments for DARPA deliverables on manufacturing of prototype blast gauges, interactions with designate agencies, and support of the pilot.</p>	30-Nov-11	\$199,288	0008	AA

9	Blast Gauge Delivery Lot #2 (ARMY) Acceptance Criteria: Delivery of 2550 blast gauges which pass all tests and quality metrics identified in the quality plan, and marked and packaged according to the specification in task 5.1	30-Nov-11	\$84,060	0009	AA
10	Pilot Research and Program Support Acceptance Criteria: Performer meeting commitments for DARPA deliverables on manufacturing of prototype blast gauges, interactions with designate agencies, and support of the pilot.	30-Dec-11	\$96,013	0010	AA
11	Blast Gauge Delivery Lot #3 (ARMY) Acceptance Criteria: Delivery of 3060 blast gauges which pass all tests and quality metrics identified in the quality plan, and marked and packaged according to the specification in task 5.1	30-Dec-11	\$100,872	0011	AA
12	Blast Gauge Delivery Lot #4 (Air Force) Acceptance Criteria: Delivery of 1000 blast gauges which pass all tests and quality metrics identified in the quality plan, and marked and packaged according to the specification in task 5.1	30-Dec-11	\$100,944	0012	AB
13	Pilot Research and Program Support Acceptance Criteria: Performer meeting commitments for DARPA deliverables on manufacturing of prototype blast gauges, interactions with designate agencies, and support of the pilot.	31-Jan-12	\$189,288	0013	AA
14	Blast Gauge Delivery Lot #5 (ARMY) Acceptance Criteria: Delivery of 5610 blast gauges which pass all tests and quality metrics identified in the quality plan, and marked and packaged according to the specification in task 5.1	31-Jan-12	\$184,931	0014	AA

15	Pilot Research and Program Support Acceptance Criteria: Performer meeting commitments for DARPA deliverables on manufacturing of prototype blast gauges, interactions with designate agencies, and support of the pilot.	29-Feb-12	\$166,414	0015	AA
16	Blast Gauge Delivery Lot #6 (ARMY) Acceptance Criteria: Delivery of 6120 blast gauges which pass all tests and quality metrics identified in the quality plan, and marked and packaged according to the specification in task 5.1	29-Feb-12	\$201,743	0016	AA
17	Pilot Research and Program Support Acceptance Criteria: Performer meeting commitments for DARPA deliverables on manufacturing of prototype blast gauges, interactions with designate agencies, and support of the pilot.	30-Mar-12	\$163,992	0017	AA
18	Blast Gauge Delivery Lot #7 (ARMY) Acceptance Criteria: Delivery of 6120 blast gauges which pass all tests and quality metrics identified in the quality plan, and marked and packaged according to the specification in task 5.1	30-Mar-12	\$201,743	0018	AA
19	Pilot Research and Program Support Acceptance Criteria: Performer meeting commitments for DARPA deliverables on manufacturing of prototype blast gauges, interactions with designate agencies, and support of the pilot.	30-Apr-12	\$163,992	0019	AA
20	Blast Gauge Delivery Lot #8 (ARMY) Acceptance Criteria: Delivery of 6120 blast gauges which pass all tests and quality metrics identified in the quality plan, and marked and packaged according to the specification in task 5.1	30-Apr-12	\$201,743	0020	AA

21	Pilot Research and Program Support Acceptance Criteria: Performer meeting commitments for DARPA deliverables on manufacturing of prototype blast gauges, interactions with designate agencies, and support of the pilot.	31-May-12	\$163,992	0021	AA
22	Blast Gauge Delivery Lot #9 (ARMY) Acceptance Criteria: Delivery of 7650 blast gauges which pass all tests and quality metrics identified in the quality plan, and marked and packaged according to the specification in task 5.1	31-May-12	\$252,179	0022	AA
23	Pilot Research and Program Support Acceptance Criteria: Performer meeting commitments for DARPA deliverables on manufacturing of prototype blast gauges, interactions with designate agencies, and support of the pilot.	29-Jun-12	\$163,992	0023	AA
24	Blast Gauge Delivery Lot #10 (ARMY) Acceptance Criteria: Delivery of 6760 blast gauges which pass all tests and quality metrics identified in the quality plan, and marked and packaged according to the specification in task 5.1	29-Jun-12	\$222,842	0024	AA
25	Final Report Acceptance Criteria: Final report summarizing blast gauge production activities, production capacity, and any known manufacturing, quality or performance issues.	31-Jul-12	\$166,414	0025	AA: \$162,453 AC: \$3,961
			\$3,844,904		

Delivery Information:

<p>Army Gauges US Army Rapid Equipping Force HQ AFSOC/SGR Attn: Alexander Lee Fort Belvoir, VA 22060 alexander.lee2.ctr@mail.mil</p>	<p>Air Force Gauges Attn: Lt Col Scott Walter Hurlburt Field, FL 32544 scott.walter@hurlburt.af.mil</p>
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Distribution Statement A (Approved for Public Release, Distribution Unlimited)

ATTACHMENT 4
FUNDING SCHEDULE

PROGRAM FUNDING COMMITMENTS

The Agreement has been fully funded at time of award. See Article V.

The Agreement requires no Performer cost share contributions.

Appendix C. Text of the Current DoD OT Statute and Table of Federal Agency OT Statutes

Text of the Current DoD OT Statute

10 U.S.C. § 2371b. Authority of the Department of Defense to carry out certain prototype projects

- (a) Authority.
 - (1) Subject to paragraph (2), the Director of the Defense Advanced Research Projects Agency, the Secretary of a military department, or any other official designated by the Secretary of Defense may, under the authority of section 2371 of this title [10 USCS § 2371], carry out prototype projects that are directly relevant to enhancing the mission effectiveness of military personnel and the supporting platforms, systems, components, or materials proposed to be acquired or developed by the Department of Defense, or to improvement of platforms, systems, components, or materials in use by the armed forces.
 - (2) The authority of this section may be exercised for a transaction (for a prototype project)
 - (A) that is expected to cost the Department of Defense in excess of \$100,00,000 but not in excess of \$ \$500,000,000 (including all options) only upon a written determination by the senior procurement executive for the agency as designated for the purpose of section 1702(c) of title 41 [41 USCS § 1702(c)], or, for the Defense Advanced Research Projects Agency or the Missile Defense Agency, the director of the agency that--
 - (i) the requirements of subsection (d) will be met; and
 - (ii) the use of the authority of this section is essential to promoting the success of the prototype project; and
 - (3) may be exercised for a transaction (for a prototype project)
 - (B) that is expected to cost the Department of Defense in excess of \$500,000,000 (including all options) only if--
 - (i) the Under Secretary of Defense for Acquisition, Technology, and Logistics determines in writing that--
 - (I) the requirements of subsection (d) will be met; and
 - (II) the use of the authority of this section is essential to meet critical national security objectives; and
 - (ii) the congressional defense committees are notified in writing at least 30 days before such authority is exercised.
 - (4) The authority of a senior procurement executive or director of the Defense Advanced Research Projects Agency or Missile Defense Agency under paragraph (2)(A), and the authority of the Under Secretary of Defense for Acquisition, Technology, and Logistics under paragraph (2)(B), may not be delegated.
 - (b) Exercise of authority.
 - (1) Subsections (e)(1)(B) and (e)(2) of such section 2371 [10 USCS § 2371] shall not apply to projects carried out under subsection (a).

- (2) To the maximum extent practicable, competitive procedures shall be used when entering into agreements to carry out projects under subsection (a).
- (c) Comptroller General access to information.
 - (1) Each agreement entered into by an official referred to in subsection (a) to carry out a project under that subsection that provides for payments in a total amount in excess of \$ 5,000,000 shall include a clause that provides for the Comptroller General, in the discretion of the Comptroller General, to examine the records of any party to the agreement or any entity that participates in the performance of the agreement.
 - (2) The requirement in paragraph (1) shall not apply with respect to a party or entity, or a subordinate element of a party or entity that has not entered into any other agreement that provides for audit access by a Government entity in the year prior to the date of the agreement.
 - (3) (A) The right provided to the Comptroller General in a clause of an agreement under paragraph (1) is limited as provided in subparagraph (B) in the case of a party to the agreement, an entity that participates in the performance of the agreement, or a subordinate element of that party or entity if the only agreements or other transactions that the party, entity, or subordinate element entered into with Government entities in the year prior to the date of that agreement are cooperative agreements or transactions that were entered into under this section or section 2371 of this title [10 USCS § 2371].
(B) The only records of a party, other entity, or subordinate element referred to in subparagraph (A) that the Comptroller General may examine in the exercise of the right referred to in that subparagraph are records of the same type as the records that the Government has had the right to examine under the audit access clauses of the previous agreements or transactions referred to in such subparagraph that were entered into by that particular party, entity, or subordinate element.
 - (4) The head of the contracting activity that is carrying out the agreement may waive the applicability of the requirement in paragraph (1) to the agreement if the head of the contracting activity determines that it would not be in the public interest to apply the requirement to the agreement. The waiver shall be effective with respect to the agreement only if the head of the contracting activity transmits a notification of the waiver to Congress and the Comptroller General before entering into the agreement. The notification shall include the rationale for the determination.
 - (5) The Comptroller General may not examine records pursuant to a clause included in an agreement under paragraph (1) more than three years after the final payment is made by the United States under the agreement.
- (d) Appropriate use of authority.
 - (1) The Secretary of Defense shall ensure that no official of an agency enters into a transaction (other than a contract, grant, or cooperative agreement) for a transaction (for a prototype project)
 - (2) under the authority of this section unless one of the following conditions is met:
 - (A) There is at least one nontraditional defense contractor participating to a significant extent in the prototype project.
 - (B) All significant participants in the transaction other than the Federal Government are small businesses including small businesses participating in a program described under section 9 of the Small Business Act (15 U.S.C. 638) or nontraditional defense contractors.

- (C) At least one third of the total cost of the prototype project is to be paid out of funds provided by sources other than the Federal Government.
- (D) The senior procurement executive for the agency determines in writing that exceptional circumstances justify the use of a transaction that provides for innovative business arrangements or structures that would not be feasible or appropriate under a contract or would provide an opportunity to expand the defense supply base in a manner that would not be practical or feasible under a contract.
- (3) (A) Except as provided in subparagraph (B), the amounts counted for the purposes of this subsection as being provided, or to be provided, by a party to a transaction with respect to a prototype project that is entered into under this section other than the Federal Government do not include costs that were incurred before the date on which the transaction becomes effective.
- (4) Costs that were incurred for a transaction (for a prototype project) by a party after the beginning of negotiations resulting in a transaction (other than a contract, grant, or cooperative agreement) with respect to the project before the date on which the transaction becomes effective may be counted for purposes of this subsection as being provided, or to be provided, by the party to the transaction if and to the extent that the official responsible for entering into the transaction determines in writing that--
 - (i) the party incurred the costs in anticipation of entering into the transaction; and
 - (ii) It was appropriate for the party to incur the costs before the transaction became effective in order to ensure the successful implementation of the transaction.
- (e) Definitions. In this section:
 - (1) The term "nontraditional defense contractor" has the meaning given the term under section 2302(9) of this title [10 USCS § 2302(9)].
 - (2) The term "small business" means a small business concern as defined under section 3 of the Small Business Act (15 U.S.C. 632).
- (f) Follow-on production contracts or transactions.
 - (1) A transaction entered into under this section for a transaction (for a prototype project) may provide for the award of a follow-on production contract or transaction to the participants in the transaction. A transaction includes all individual prototype subprojects awarded under the transaction to a consortium of the United States industry and academic institutions.
 - (2) A follow-on production contract or transaction provided for in a transaction under paragraph (1) may be awarded to the participants in the transaction without the use of competitive procedures, notwithstanding the requirements of section 2304 of this title [10 USCS § 2304], if--
 - (A) competitive procedures were used for the selection of parties for participation in the transaction; and
 - (B) the participants in the transaction successfully completed the prototype project provided for in the transaction.
 - (3) Contracts and transactions entered into pursuant to this subsection may be awarded using the authority in subsection (a), under the authority of chapter 137 of this title [10 USCS §§ 2301 et seq.], or under such procedures, terms, and conditions as the Secretary of Defense may establish by regulation.

- (g) Education and training. The Secretary of Defense shall—
- (1) ensure that management, technical, and contracting personnel of the Department of Defense involved in the award or administration of transactions under this section or other innovative forms of contracting are afforded opportunities for adequate education and training; and
 - (2) establish minimum levels and requirements for continuous and experiential learning for such personnel, including levels and requirements for acquisition certification programs.
- (h) Authority to provide prototypes and follow-on production items as Government-furnished equipment. An agreement entered into pursuant to the authority of subsection (a) or a follow-on contract or transaction entered into pursuant to the authority of subsection (f) may provide for prototypes or follow-on production items to be provided to another contractor as Government-furnished equipment.
- (i) applicability of procurement ethics requirements. An agreement entered into under the authority of this section shall be treated as a Federal agency procurement for the purposes of chapter 21 of title 41 [41 USCS §§ 2101 et seq.].

Table of Federal Agency OT Statutes

Department/Agency	Statutory OT Authority	Purpose/Limits
DoD	10 U.S.C. § 2371(a) 10 U.S.C. § 2371(b)*	<ul style="list-style-type: none"> • Basic, applied, and advanced research projects • Prototype projects
DOE	42 U.S.C. § 7256(g)	<ul style="list-style-type: none"> • Research, development, and demonstration projects
DOE/Advanced Research Project Agency – Energy (ARPA-E)	42 U.S.C. § 16538(f)	<ul style="list-style-type: none"> • Unlimited, but focused on developing advanced technology
Department of Health & Human Sciences (HHS)	42 U.S.C. § 247d-7e(a)(3)	<ul style="list-style-type: none"> • Basic, applied, and advanced research projects • Prototypes

HHS/National Institutes of Health (NIH)	42 U.S.C. § 285b-3(b)(3) 42 U.S.C. § 284n(b)(1)	<ul style="list-style-type: none"> • For national, heart, blood vessel, lung, and blood diseases and blood resources projects • Certain demonstration projects
DHS	6 U.S.C. § 391(a)(1)	<ul style="list-style-type: none"> • Basic, applied, and advanced research projects • Prototypes
DHS/Domestic Nuclear Detection Office (DNDO)	6 U.S.C. § 596(1)	<ul style="list-style-type: none"> • Unlimited
DHS/Transportation Security Administration (TSA)	49 U.S.C. § 114(m)	<ul style="list-style-type: none"> • Unlimited
Department of Transportation (DOT)	49 U.S.C. § 5312(a)(1) and (b)(2)	<ul style="list-style-type: none"> • Research, development, demonstration, and deployment projects, and evaluation of technology of national significance to public transportation
DOT/Federal Aviation Administration (FAA)	49 U.S.C. § 106(l)(6)	<ul style="list-style-type: none"> • Unlimited
NASA	51 U.S.C. § 20113(e)	<ul style="list-style-type: none"> • Unlimited

Source: Hephner, M., Virtual Acquisition Office (March 2018).

* Per discussion in Chapter 3, the study is delimited to this statute.

Appendix D. Major Legislative Amendments to the OT Statute

NDAA Fiscal Year (FY), Date, Congress	Public Law, Section	Committee Reports	Conference Report	Summary
NDAA FY 1990-1991 Nov. 28, 1989 101 st Congress	101-189, § 251	*H. Rpt. 101-121, HASC Rpt. For NDAA for FYs 1990-1991 *S. Rpt. 101-81, SASC Rpt. For NDAA for FY 1990-1991	H. Rpt. 101-331, Conference Rpt. For NDAA FYs 1990-1991	Created OT authority only for DARPA. Two-year pilot program; research projects only, no prototype projects
NDAA FY 1994 Nov. 30, 1993 103 rd Congress	103-160, § 845	H. Rpt. 103-200, HASC Rpt. For NDAA FY 1994 S. Rpt. 103-112, SASC Rpt. For NDAA FY 1994	H. Rpt. 103-357, Conference Rpt. For NDAA FY 1994	Created prototype project OT authority for DoD: DARPA may use OTs for weapons or weapons systems prototype projects
NDAA FY 1997 Sept. 23, 1996 104 th Congress	104-201, § 804	H. Rpt. 104-563, HASC Rpt. For NDAA 1997 S. Rpt. 104-267, SASC Rpt. For NDAA FY 1997	H. Rpt. 104-406, Conference Rpt. For NDAA FY 1996	Defense agencies and the Military Departments and “any other official designated by SECDEF” authorized to use OTs for prototype projects
NDAA FY 2001 Oct. 6, 2000 106 th Congress	106-398, §§ 803, 804	*H. Rpt. 106-616, HASC Rpt. For NDAA FY 2001		Added definition of nontraditional contractor and added a cost sharing for requirement for traditional contractors

		*S. Rpt. 106-292, SASC Rpt. For FY 2001		
NDAA FY 2002 Dec. 28, 2001 107 th Congress	107-107, § 822	H. Rpt. 107-194, HASC Rpt. For NDAA FY 2002 *S. Rpt. 107-62, SASC Rpt. For NDAA FY 2002	H. Rpt. 107-333, Conference Rpt. For NDAA FY 2002	Authorized noncompetitive follow-on production contracts for successful OTs
NDAA 2004 Nov. 24, 2003 108 th Congress	108-136, § 847	H. Rpt. 108-354, HASC Rpt. For NDAA FY 2004 *S. Rpt. 108-46, SASC Rpt. for NDAA FY 2004	*H. Rpt. 108-354, Conference Rpt. For NDAA FY 2004	Expanded definition of prototype projects
NDAA FY 2006 Jan. 6, 2006 109 th Congress	109-163, § 823	H. Rpt. 109-89, HASC Rpt. NDAA FY 2006 *S. Rpt. 109-69, SASC Rpt. NDAA FY 2006	H. Rpt. 109-360, Conference Rpt. For NDAA FY 2006	Added requirements for higher level (Agency Head, Pentagon) approval of high dollar value OTs
NDAA FY 2015 Dec. 19, 2014 113 th Congress	113-291, § 812	H. Rpt. 113-446, HASC Rpt. For NDAA FY 2015 *S. Rpt. 113-176, SASC Rpt. For NDAA FY 2015		Expanded definition of prototype projects. Added small businesses to the definition of nontraditional contractor

<p>NDAA FY 2016 Nov. 25, 2015 114th Congress</p>	<p>114-92, § 815</p>	<p>*H. Rpt. 114-102, HASC Rpt. For NDAA FY 2016</p> <p>*S. Rpt. 114-49, SASC Rpt. For NDAA FY 2016</p>	<p>*H. Rpt. 114-270, Conference Rpt. For NDAA FY 2016</p>	<p>Made OT authority permanent for DoD. Codified law at 10 U.S.C. § 2371b. Expanded definition of nontraditional contractor</p>
<p>NDAA FY 2018 Dec. 12, 2017 115th Congress</p>	<p>115-91 Title VIII, Subtitle G</p>	<p>*H. Rpt. 115-200, HASC Rpt. For NDAA 2018</p> <p>S. Rpt. 115-125, SASC Rpt. For NDAA FY 2018</p>	<p>H. Rpt. 115-404, Conference Rpt. For NDAA FY 2018</p>	<p>Increased DARPA and military Secretary OT approval authority to \$500M; Authorized non-federal sources to contribute to OT cost-share; Authorized OTs to be used for DoD SBIR/STTR small businesses; Directed DoD to develop training curriculums for DoD OT personnel; and Directed DoD to establish a preference for using OTs for R&D work.</p>

Sources: LEXIS-NEXIS; GPO (2018).

* Relevant interpretive congressional language included in the report.

Appendix E. Main Interview Questions and Subsidiary Interview Questions

1. What do participants believe are institutional and other factors that influence the decision to use an OT instead of a traditional procurement agreement?
 - a) How does your organization determine to select an OT instead of a traditional procurement agreement such as a contract, grant, or cooperative agreement?
 - b) If you select an OT, what factors can influence negotiations to succeed?
 - c) If you select an OT, what factors can influence OT negotiations to fail?

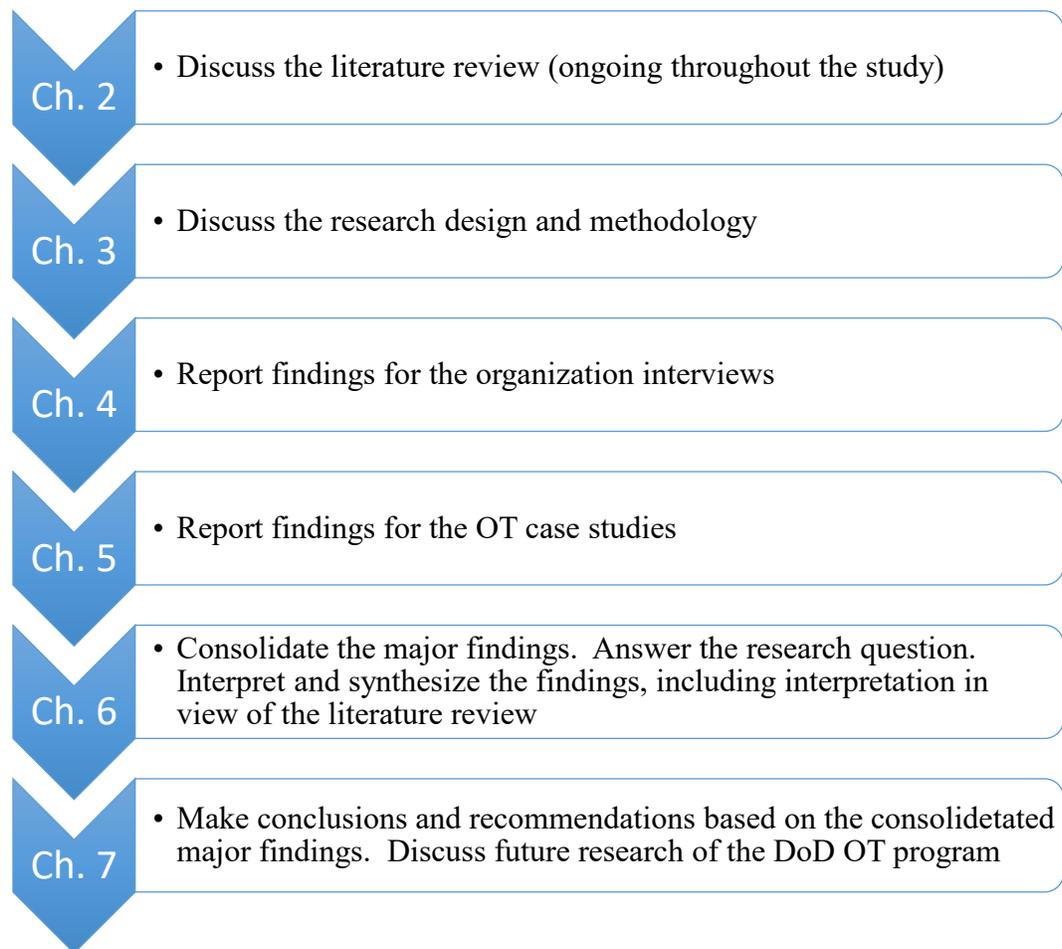
2. What do participants believe are the advantages of OTs compared to traditional procurement agreements?
 - a) What are the advantages of using OTs compared to traditional procurement agreements such as contracts, grants, and cooperative agreements?
 - b) How do the advantages of OTs contribute to the wider use of OTs in your organization?
 - c) How do the advantages of OTs contribute to the wider use of OTs in other DoD organizations?

3. What do participants believe are the disadvantages of OTs compared to traditional procurement agreements?
 - a) What are the disadvantages of using OTs compared to traditional procurement agreements such as contracts, grants, and cooperative agreements?
 - b) How do disadvantages of OT contribute to the lesser use of OTs in your organization?
 - c) How do disadvantages of OTs contribute to the lesser use of OTs in other DoD organizations?

4. What do participants believe explains DoD's relatively low use of OTs compared to traditional procurement agreements?
 - a) What factors in your organization help explain the number of OTs executed compared to traditional procurement agreements such as contracts, grants, and cooperative agreements?
 - b) What DoD factors help explain the numbers of OTs compared to traditional procurement agreements?
 - c) What are the major factors that help explain the numbers of OTs compared to traditional procurement agreements?

5. What do participants believe are factors that could be changed to result in wider use of OTs?
 - a) What factors in your organization could be changed to result in the wider use of OTs?
 - b) What DoD factors could be changed to result in the wider use of OTs?
 - c) What factors do you believe are resistant to change, but if changed, would result in the wider use of OTs?

Appendix F. Research Design Flowchart and Corresponding Dissertation Chapters



Source: Flowchart design adapted from Bloomberg (2012).

Appendix G. IRB Approval Documentation



Office of Research Compliance
 Institutional Review Board
 North End Center, Suite 4120, Virginia Tech
 300 Turner Street NW
 Blacksburg, Virginia 24061
 540/231-4606 Fax 540/231-0959
 email irb@vt.edu
 website <http://www.irb.vt.edu>

MEMORANDUM

DATE: May 5, 2017 

TO: Patrick S Roberts, Crane L Lopes

FROM: Virginia Tech Institutional Review Board (FWA00000572, expires January 29, 2021)

PROTOCOL TITLE: Historical institutionalism and defense public procurement: the case of other transactions agreements

IRB NUMBER: 17-034

Effective May 5, 2017, the Virginia Tech Institution Review Board (IRB) Chair, David M Moore, approved the New Application request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

<http://www.irb.vt.edu/pages/responsibilities.htm>

(Please review responsibilities before the commencement of your research.)

PROTOCOL INFORMATION:

Approved As: **Expedited, under 45 CFR 46.110 category(ies) 5,6,7**
 Protocol Approval Date: **May 5, 2017**
 Protocol Expiration Date: **May 4, 2018**
 Continuing Review Due Date*: **April 20, 2018**

*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:

Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals/work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

Invent the Future

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
 An equal opportunity, affirmative action institution

Appendix H. Brief Overview of the Study

Historical Institutionalism and Defense Public Procurement: The Case of Other Transactions Agreements

Research problem

In recent decades, DoD has had mixed success in developing advanced technologies because the most innovative contractors are unwilling to do business with DoD due to the perceived burdensome DoD procurement system. In 1989, under 10 U.S.C. § 2371b, Congress established Other Transactions Agreements (OTs) as a new DoD procurement process. OTs address the burden of the DoD procurement system by being exempt from all the legal, regulatory, and policy requirements of the DoD procurement system. Since 1989, Congress has expanded OT authority. DoD has published policy guidance to help negotiate and administer OTs. Despite these efforts, OTs have not been used by DoD as widely as expected. There is no consensus on why OTs are not more widely used by DoD. This is puzzling because studies find that OTs are useful for developing advanced technologies for DoD.

Purpose

The purpose of the study is to explore a sample of DoD officials' perceptions of factors that have impacted DoD use of OTs. This will include semi-structured interviews of criterion-selected participants at DoD R&D organizations that have recorded OTs in fiscal years 2011-2015. Case studies of OTs identified by participants will be used for triangulation. The study will review qualitative documents about OTs and the historical institutionalism literature. It is hoped that by gaining a better understanding of the factors that have impacted DoD use of OTs that policy recommendations can be made to contribute to the wider use of OTs by DoD.

Research hypothesis

Although Congress has amended the OT statute to encourage wider use OTs, DoD has continued to use OTs sparingly. Based on the researcher's professional experience, institutional resistance to using OTs can be traced to path dependence and positive feedback mechanisms such as low leadership support and employee risk aversion and habit. The numbers and variety of OTs at some DoD organizations, however, indicate that institutional change is occurring, and this may lead to a critical juncture or policy tipping point, resulting in wider use of OTs across DoD.

Research question and five main interview questions

Why, despite their reported administrative advantages, are OTs only sparingly used by DoD compared to traditional procurement agreements?

1. What do participants believe are institutional and other factors that influence the decision to use an OT instead of a traditional procurement agreement?
2. What do participants believe are the advantages of OTs compared to traditional procurement agreements?

3. What do participants believe are the disadvantages of OTs compared to traditional procurement agreements?
4. What do participants believe explains DoD's relatively low use of OTs compared to traditional procurement agreements?
5. What do participants believe are factors that could be changed to result in wider use of OTs?

Appendix I. Literature Sources and Keyword Search Terms

Congressional Research Service Reports,

<https://www.everycrsreport.com><https://www.everycrsreport.com>)

845

other transactions

prototypes

DoD Inspector General Reports,

<http://www.dodig.mil/pubs/index.cfm>

845

other transactions

prototypes

Government Accountability Office Reports,

<https://www.gao.gov/browse/date/week>

845

other transactions

prototypes

Manual Searches of Peer-Reviewed Journals

Last three years of Governance

Last three years of Polity Journal

Last five years of Public Administration Review

Last five years of Public Contracts Law Journal

National Academies of Sciences,

<http://www.nasonline.org/publications/pnas/>

845

prototypes

other transactions

VT Summon,

<http://www.lib.vt.edu/help/screencasts/summon/>

acquisition [TITLE] + path depend! [ABSTRACT]

discursive institutional! [TITLE] + historical! [ABSTRACT]

institutionalism [TITLE] + feedback [ABSTRACT]

innovation [TITLE] + public procurement [ABSTRACT]

historical institutionalism [TITLE] + comparative [ABSTRACT]

historical [TITLE] + path [ABSTRACT]

historical [TITLE] + institutional! [ABSTRACT]
institutional! [TITLE] + positive [ABSTRACT]
institutional! [TITLE] + increasing return! [ABSTRACT]
institutional! [TITLE] + juncture! [ABSTRACT]
institutional! [TITLE] + mechanism! [ABSTRACT]
institutional! [TITLE] + endogenous [ABSTRACT]
institutional! [TITLE] + exogenous [ABSTRACT]
institutional! [TITLE] + path depend! [ABSTRACT]
institutional! [TITLE] = positive feedback [ABSTRACT]
learning innovation [TITLE] + social groups [ABSTRACT]
learning [TITLE] + social innovation [ABSTRACT]
learning [TITLE] + procurement [ABSTRACT]
microfoundation! [TITLE] + learning [ABSTRACT]
path depend! [TITLE] + innovation [ABSTRACT]
path depend![TITLE] + theory [ABSTRACT]
path depend! [TITLE] + institutional! [ABSTRACT]
procurement [TITLE] + path depend! [ABSTRACT]
public [TITLE] + path depend! [ABSTRACT]
reform [TITLE] + path depend! [ABSTRACT]
social learning theory [TITLE] + innovation [ABSTRACT]

Appendix J. Literature Map

Map key:

- = new article: post-prospectus
- Underlined = case study.
- Bold** = quantitative study.
- Italicized* = literature review.
- Dotted underlined = survey
- Italicized & underlined* = book chapter or book review
- Double underlined = book the researcher owns

OT Practitioner Literature

- Beutel (2018) – DIUx \$950M follow-on production contract impact on industry
- Bloch-McEwen (2002) – OTs cure DoD/KoR IP needs; OTs are an untapped resource
- C&L Rpt (1994)** – Quantitative assessment of DoD regulatory cost premium
- Cassidy (2013) – Overview of TIA/845 OTs; pros/cons; industry perspective
- DoD (DPAP) (2015) – OT white paper: sumry of OTs/BBP 3.0/Congsnl viewpoint
- DCAA (2012) – Defense Contract Audit Manual – discsn. advtgs. of OTs v. TPAs
- DoD (AT&L) (2002) – OT Guide for prototype projects: guidance on negotiating OTs
- DoD (AT&L) 2017 – Updated OT Guide
- DoD (AT&L) – OT cost sharing report to Congress
- DoD (AT&L) (2015) – BBP 3.0
- DOD(AT&L) (2016) – New OT delegations to MDA/DTRA; cost reporting thresholds
- DoD DBB (2015) – Summarizes institutl problems w/DoD S&T v. commercial S&T
- DoD (R&E) (2014) – R&D strategy; technology dominance needed; policy needs
- DPAP (BBP 3.0) (2015) – technical dominance = remove barriers to innovation xfers

DoD IG (1998) – Audit of administration of OTs by defense agencies and military svcs.

DoD IG (1999) – Audit of costs charged by contractors to OTs

Dix (2003) – federal procurement barriers to contracting with DoD

- Doubleday (2018) – Pentagon seeks governance model for OTs

Dunn (2009) – OT history; OT case studies; response to critics of OTs’ policy recmdtns.-

- Dunn (2017) – OTs should be the preferred means for conducting contracted R&D
- Dunn (2017) – President and DoD leadership should require DoD to use more OTs
- Dunn (2018) – What laws apply to OTs?

Fike (2009) – proposes several metrics for OTs; e.g., time save in negotiation

GAO-96-11 – pros/cons of TIA OTs (pre-845 OT era)

GAO-01-980T – GAO testimony to Congress re: Bayh Dole and OTs – benefits

GAO-00-33 – few nontraditional contractors; no reliable metrics for OTs

GAO-16-209 – limited use of OTs by 11 federal agencies; leg. History of OTs

GAO-03-150 – DoD nontraditional KoR metric is not useful/non-reported to Congress

Hanson (NPGS) (2005) – OTs do not attract nontraditional Kors; RDT&E budget discsn.

Halchin (CRS) (2011) – Leg. Hist of fedl. OTs’; OT pros/cons; metrics policy options

- Hephner (2018) – Federal agency OT statutes table (used in Appx. C)

Kuyath (1995) – early cited advantages of OTs; history of OTs

- Mazmanian (2018) – Congress may rein in OTAs based on GAO B-416061

Modestzo (2005) – Background of OTs, including events leading up to OT statute

Pellerin (2015) – Def. News art. about SECDEF visit to Silicon Valley & his S&T goals

- Schooner (2002): K law desiderata – normative principles of US procurmt. system

Schooner (1997) – acq. reform in federal procurmt. requires cultural change/risk taking

- Schooner (2009) – public procurement needs more people not rules
- Smith (RAND) (2002) – OT metrics not feasible and OT pros/cons
- Stevens (NPGS) (2016) – leg. History OTs; pros/cons OTs; policy recomdtns. OTs
- Sumption (1999): US R&D strategy; OT leg. history; TIA/845 OTs; OT pros/cons
- Vadiee & Garland (2018). Recent OT leg. hist. of OTs; OT Guidelines for contractors
- White House (2015) – national strategy: US as innovation leader; R&D as public good
- White House (2016) – 21st century invtn strategy: sustain tech. superiority in new world

Policy Diffusion/Transfer Literature

- Berry & Berry (Sabatier) – Overview of policy invtn. Lit.: EHA and prior quant. models
- Chandler (2015) – institutional learning, microfoundations
- Garrett** (2015) – social network analysis of diffusion, role of special interest groups
- Gilardi (2016) – 4 ways to improve diffusion policy research
- Gok** (2013) – EHA + institutional theory (learning) & mimetic/normative isomorphism
- Karch (2007) – political factors causing diffusion. Diffusion as IV/DV
- Lofgren (2009) – policy innovation rsch. must consider instnl. setting/impltn. processes
- Magetti* (2016) – 6 diffusion indicators, pervasive problems w/diffusion research
- Marsh (2009) – policy transfer v. policy diffusion; political factors of diffusion
- Mintrom** (1997) – role of policy entrepreneurs – EHA study
- Mosier** (2016) – EHA: internal v. external factors – US organic food policy
- Nichols (2008) – institutional factors for diffusion of e-learning in NZ
- Shipan** (2008) – interrelationship of 4 diffusion mechanism – EHA antismoking states

Shipan (2012) – 7 lessons for diffusion practitioners/scholars

Singh (2014) – institutional (social) drivers of diffusion of e-learning technologies

Schenckenberg (2015) – Intra-firm microfoundations of innovation in a UK company

Tyran (2005) – EHA: policy experimentation/emulation diffusion factors

Volden (2016) – EHA: learning and abandonment of failed policies in diffusion

Walker (2006) – diffusion of innovation policy in UK local govt. Complex factors

Public Procurement of Innovation (PPI) Literature

Avadikyan, (2005) – cultural and structural barriers in defense industry

Borras (2013) – policy instrument design for PPI

Bronzini (2016) – innovation metrics (grants)

Edler (2013) – role of intermediation in PPI

Edquist (1999) – interactive learning/systems approach to PPI

Edquist (2012) – types of demand side PPI

Fabrizio (2007) – market failure history of US IT PPI – US successes

Flyvbjerg (2014) – Overview of study of megaprojects; 6 features of megaprojects

Georghiou (2014) – public agency barriers to PPI in EU

Hommen (2009) – interactive learning in PPI

Meijer (2009) – Intro to Info Polity issue on integrating PA theory into public innovation

Mowery (2012) – US v. EU technology public R&D framework – WWII to present

Rolfstam (2009) – endogenous/informal institutional factors of PPI

Rolfstam (2011) – exogenous/endogenous institutional factors of PPI

Uyarra (2014) – private sector perceptions of barriers to innovation in PPI

Historical Institutionalism (HI) Literature

Abeysinghe (2012) – Discursive v. institutional path dependency

Blyth (2016) – Problems with integrating change into general theory of HI

- Beland/Powell (2016) – Summary of types of endogenous change
- Beland/Rocco (2016) – Analytical mechanisms of Hacker’s policy drift

Broschek (2013) – HI is good for analyzing federal systems and dynamics

Capoccia (2007) – Methodological framework for critical junctures research

Capoccia (2016) – Top down resist. to endgns. change: cultural cats. & agenda setting

- Clemens (1999) – Mechanisms of institutional change (new institutionalism)

Coombs (1998) – KMP as sources of path dependency in firm innovation

- Drezner (2010) – Critique of HI; does not do a good job for prediction

Ermakoff (2010) – HI v. RI; definition of institutions (book review: not favorable)

Greif (2004) – Game-centric quasi-parameters & self-reinforcement to explain HI

Hay (1998) – HI should use SI principles to help integrate change into HI

- Howlett (2009) – Process sequencing is more robust model of end. chng. than HI/PD
- Howlett (2009) – dep. variable prob: homeostatic/quasi-homo/neo homo chge models
- Koning (2016) – Integrating HI/RI/DI for an integrated model of exog./endog. change

Immergut (1998) – HI, RI and SI have common core; HI particly. useful analysis tool

- Jacobs – (2015) – Self-undermining feedback as a complement to positive fdbk in HI

Kickert (2011) – HI useful in developing typologies of gradual change

Kuipers (2009) – PD as a source of institutional failure – studies of TVA and PANY

Ma (2007) – HI based on complexity science & challngs. tradtl. Newtnian institl. theories

March & Olsen (1983) – Origin of NI as distinct from traditional institutionalism

Peters (2005) – HI does not explain change; political conflict & big ideas as HI factors

- Pianizza (2013) – PSDT as an augmentation to DI model of endog. change

Pierson (2000) – Definition of HI; economic origins of instl. path dependence

Schreyogg (2009) – PD in institutional v. technological setting; org. learning PD

- Schmidt (2008)- DI is an agent-based explanation of institutional change for HI

Sorenson (2015) – HI frmwk: path dep., crit. junc., endogs. instl. change mechanisms

Torfing (2009) – 4 analytical challenges to path dependence research

Sarigil (2014) – Habit as an alternative explanation to tradtl. rational and normative PD

Stack (2003) – Path creation v. path dependence; policy entrepreneurs drive path creation

Thelen (1999) – Ratl. v. historical. Institlsm, understanding feedback mechanisms is key

Zehavi (2012) – Small domain HI differs from large domain HI; endgs. change easier

Organizational Learning/Change (OChange) Literature

Ansell (2011) – Pragmatism & evolutionary learning for endogenous institl. change

Borras (2011) – 3 levels of policy learning in innovation policy; org, capacity critical

Decker (1986) – Social learning theory applies to training leaders/managers

Kelman (2005) – Unleashing change via change constituencies and change momentum

Holden (2008) – Social learning in Seattle sustainable processes; knowledge codebooks

Kezar (2001) – 6 theories of organizational change (Appendix has good summary of 6)

Kristsonis (2004) – Comparison of change theories, Lewin, etc.

Lewis (2012) – Universal Darwinism theory as mode for institutional change

Ventriss (1988) – Role of substantive learning as a species of org. learning in PA

Reference Materials/Research Design

- Beach (2012) – Conceptualizing causal process tracing (CPT) mechanisms
 - Beach (2016) – Mechanism approach to comparative case study using typical cases
 - Bennett (2006) – Small n qualitative case study methods
- BONO (2011) – How to write a good research design, including construct (CAP B)
- Boote (2005) – 12-part, five category rubric for a good literature review
 - Boychuk (2016) – Comparative case stud. in HI research. – equifinality, overdetermn.
 - Bozeman (2016) – Case study of over compliance red tape – the Stanford yacht scandal
 - Bullock (2016) – Qualitative interviews and data analysis
- Campbell (2003) – Methods for improving inter-coder reliability for interview transcripts
- Cotton (2016) – YouTube video on manual inductive coding using themes & sub-themes
- DiCocco-Bloom (2006) – qualitative interviews, data analysis and ethical issues
- Druckman (2011) – comparative case study rsch – focused case comparison, MDSD
- **Eckerd** – Role of PM in MDAPs – NPM v. institutionalism; limits of quantitative
- Emergent (no date) – Tips and tools: coding qualitative data (basic fact sheet and intro)
- Evan & Thoman (2017) – QCA method, internal and external validity
- Geletkanyz (2012) – Discussing the implications (findings) of a study (CAP B)

Graneheim (2003) – Manual inductive coding process for interviews; coding terminology

Grant (2007) – Effective manuscript introductions (CAP B)

- Hall (2003) – Systematic process analysis + case studies for HI rsch. – no quant.
- Hall (2012) – Verities of process tracing in qualitative research

Haverland (2012) – Methodologies/epistemologies, interpretive case rsch (CAP B)

Jensen (2015) – Slides for how to write a literature review (CAP A)

Kaarbo (2011) – Guide to comparative case study research – 5 steps for research. design

- Kay (2015) – Steps of how to do CPT, Bayesian methodology, CPT literature review
- Leech (2007) – 7 data analysis techniques: coding, content analysis. Representation

Locke (2008) – Role of abduction and generative doubt in research (CAP A)

- Mahoney (2006) – Qual. v. Quant rsch: equifinality and case selection

Marsh (2002) – Ontology and epistemology approaches to research (CAP A)

Matheson (2007) – Voice recognition technique for coding digital interview data

- **Pandey** (1997) – Red tape OLS/survey on impact of IT adoption on red tape
- Pratt (2009) – AMJ suggestions for improving qualitative data methods/results
- Reykers (2017) – Process tracing in principal/agent research
- Rohlfsing (2012) – Two types of process tracing: realized and anticipated
- Sofaer (2002) – qualitative research methods, interviews and data analysis

Sparrowe (2011) – Grounding hypothesis in the theory section (CAP B)

Sutton (1995) – Role of theory in rsrch; what theory isn't (e.g., hypotheses) (CAP A)

- TCEC (2012) – Tips for analyzing qualitative data; 5 step analysis process; and analysis pitfalls

Tummers (2012) – Opportunities/pitfalls of literature rvw. in qual. Rsch. phases (CAP B)

- Vannoni (2015) – Millian MD and MA comparative case study methods

Whetten (1989) – What constitutes a theory – elements: what, why, how, when (CAP A)

- Yin (2008) – Case study research and design (see field notes on ea. Chapter)

Zhang (2012) – Crafting methods and results manuscript sections (CAP B)

Appendix K. Sample Article Abstracts

Abstract: Tyran & Sausgruber (2005). This mixed method study (lab experiment) considers the question, what causes the government to adopt a new program or policy? Despite many empirical studies on this topic, the relative importance of determinants remains obscure because of the difficulties of statistical identification. The authors use a laboratory setting to study policy diffusion under an approach that differentiates between experimentation, experience, and emulation as determinants of policy adoption. The study acknowledges that it is almost impossible to disentangle the different mechanism in the diffusion of policy innovations. The article uses a new experimental approach to shed light on this problem. The authors believe this approach complements Event History Analysis (EHA) and simulation studies. The key point of this article is that differences in the rate of policy innovation over time can be explained by institution-specific experimentation, experience, and policy emulation. The study concludes that experimentation itself leads to low levels of policy innovation and that emulation impacts policy innovation and improves efficiency. Quality learning is an important source of diffusion of innovations.

Abstract: Lewis (2012). This theory-building article argues that questions of gradual endogenous institutional change can be understood as an evolutionary process that can be explained through the application of generalized (universal) Darwinism. This framework integrates human cognitive capacities into an institutional change model by arguing that human advanced cognitive abilities contribute to an evolutionary understanding of institutional change. Traditional models of institutional change such as rational choice and historical institutionalism do not account for institutional change, since their view of institutions is

static. This article does not suggest that biological and institutional evolution are the same. Instead, it argues that there is a growing literature that posits that biology is just one type of evolution in which evolutionary processes take place. Evolution is a universal process rather than confined to biological systems. Thus, universal Darwinism can explain institutional development. Richard Dawkins is credited with coining the phrase universal Darwinism, which refers to the notion that all dynamic human social processes can be reduced to a straightforward algorithm: variation, selection, retention. In the universal Darwinism approach to institutional development, new ideas and agentic processes are analogized to mutations that are selected or rejected to become part of the institutional framework. The article concludes that viewing institutions through the lens of universal Darwinism integrates analysis of agency and structure because of the focus on the iterated interactions of agents in their environment.

Appendix L. Advantages and Disadvantages of OTs from Literature Topic One

Author	Advantages of OTs	Disadvantages of OTs
Kuyath (1995)	<ul style="list-style-type: none"> • Cost-matching by contractor • Innovative competition requirements • Fixed payable milestones – streamlined accounting processes for contractor • Flexibility • Attract nontraditional contractors to DoD • Consortiums – efficiency gains for members • Encourages long-lasting business relationships between subcontractors/suppliers • Flexible intellectual property rights • Contractors without CAS based accounting systems can participate in OTs • Overhead costs savings due to less contractor compliance costs 	<ul style="list-style-type: none"> • Lack of administrative safeguards – more risk of fraud, waste, abuse • cost-sharing can deter traditional contractors • Intellectual property rights among consortium members can be challenging to negotiate • No OT authority for the DoD SBIR program
Bloch (2002)	<ul style="list-style-type: none"> • Attracts qualified high technology contractors 	<ul style="list-style-type: none"> • Attracts mostly traditional contractors
Dunn (2009)	<ul style="list-style-type: none"> • Flexibility in contractual relationships • Flexibility in intellectual property rights • Accommodation of commercial business systems • Freedom from FAR contracting approach • Promotes communication between government and 	<ul style="list-style-type: none"> • Poorly understood by many traditional DoD procurement professionals • Subject to unwarranted criticisms • OT environment is challenging and rewarding for some, challenging and bewildering to others • Clean sheet of paper approach to negotiations

	<p>industry and among industry team</p> <ul style="list-style-type: none"> • Accelerates development and fielding of new system • Limited GAO protests 	<p>requires thoughtful preparation and a well thought out program</p>
Dunn (2017)	<ul style="list-style-type: none"> • Quicker, better, less expensive than traditional procurement agreements 	<ul style="list-style-type: none"> • Cultural resistance to change within DoD; culture change needed • May need new offices to execute innovative contracting • Lack of training and education • Revised OT policy guidance needed • Need more flexible contracting and fiscal laws
Cassidy (2013)	<ul style="list-style-type: none"> • Flexible terms and conditions • Payable milestones 	<ul style="list-style-type: none"> • Uncertainty whether specific laws apply to OTs
Stevens (2016)	<ul style="list-style-type: none"> • Flexible terms and conditions • Attracts nontraditional contractors • Cost-sharing • Better manage risk and uncertainties • Innovative business relationships 	<ul style="list-style-type: none"> • Lack of administrative safeguards • Lack of concrete metrics to measure success • Cost-sharing can dissuade traditional contractors • No dedicated platform for advertising OT opportunities • Lack of trainers and adequate training materials • No dedicated OT writing system • Lack of step-by-step policy guidance for OTs • Few OT subject matter experts

		<ul style="list-style-type: none"> • No knowledge management system and succession planning • No dedicated Government-wide working group for capturing lessons learned and best practices • No OT historian for each DoD component • Culture shock for DoD personnel used to traditional procurement agreements
Sumption (1999)	<ul style="list-style-type: none"> • Flexibility • Government can team with consortiums • Cost-sharing increases project affordability to DoD • Commercial-like business practices • Increased trust between Government and industry 	<ul style="list-style-type: none"> • Cultural resistance to OTs within DoD • Lack of training on OTs; Lack of DoD leadership commitment to OTs • Lack of DoD centralized guidance and information on OTs • Lack of OT templates
Fike (2009)	<ul style="list-style-type: none"> • Project cost savings due to reduced contractor compliance costs • Innovative business relationships 	<ul style="list-style-type: none"> • Majority of OT awards go to traditional contractors • Lack of reliable OT performance metrics • Lack of counterfactual analysis data – e.g., would a traditional procurement agreement have been a better choice than an OT?
Dix (2003)	<ul style="list-style-type: none"> • Flexibility • Freedom of contract – blank sheet of paper negotiation approach • Attract nontraditional contractors to DoD 	None identified
GAO (1996)	<ul style="list-style-type: none"> • Cost sharing • New relationships and practices within the 	<ul style="list-style-type: none"> • Less administrative safeguards

	<p>defense industry, e.g., consortiums</p> <ul style="list-style-type: none"> • Leverage private sector financial investment: \$1.39 of private investment for every \$1.00 of DoD investment 	<ul style="list-style-type: none"> • Intellectual property provisions not explicitly defined • Need DoD policy guidance on use of OTs
GAO (2000)	<ul style="list-style-type: none"> • Attracts commercial firms that rarely do business with DoD • Flexibility • Access to commercial products or processes • Reduced program cost • Improves cultural relationship between DoD and contractor • Streamlined acquisition process • Spurs technological innovation • Resolves various solicitation issues 	<ul style="list-style-type: none"> • Mixed data on whether OTs are attracting such commercial firms • No meaningful performance metrics – e.g., for measuring cultural change • Updated DoD policy guidance needed
GAO (2016)	<ul style="list-style-type: none"> • Flexibility • Attracts nontraditional contractors 	<ul style="list-style-type: none"> • Small numbers of OTs compared to traditional procurement agreements • Reduced accountability and transparency – e.g., no CAS compliance requirements
CRS (Halchin) (2011)	<ul style="list-style-type: none"> • Flexibility to tailor OT to a particular transaction • Attract nontraditional contractors • No GAO bid protests • Protection of intellectual property rights of contractor 	<ul style="list-style-type: none"> • No quantifiable performance metrics • Low use of OTs: most OTs are awarded to traditional contractors • No OT-specific intellectual property regulations and accounting standards • No Government website for OT opportunities

		<ul style="list-style-type: none"> • Agencies should be required to submit reports regularly to Congress about their use of OTs.
RAND (2002)	<ul style="list-style-type: none"> • Flexibility • Private industry more willing to work for DoD • Better management of risks and uncertainties • Better project structure through new and innovative business relationships • DoD gets more value per dollar spent 	<ul style="list-style-type: none"> • Lack of reliable performance metrics • Limited DoD access to contractor financial records • OTs limit DoD rights to intellectual property
ONR (2017)	<ul style="list-style-type: none"> • Attracts nontraditional contractors • Removes traditional procurement processes • Flexible terms and conditions • No certified cost or pricing data needed • No GAO protests • Noncompetitive follow-on production contracts possible 	<ul style="list-style-type: none"> • Time-consuming to negotiate • Need clear expectations of milestones and deliverables • Financing challenges—e.g., significant up-front investment by contractor • Negotiating intellectual property rights can be challenging • Evaluating cost or price reasonableness can be challenging • OT disputes still subject to federal court jurisdiction

Source: Chapter 2, Literature Topic One.

Appendix M. Endogenous Institutional Change Mechanisms from Literature Topic Two

Author	Endogenous Change Mechanism(s)	Example of Change Mechanism(s) in DoD OT Program
Clemens (1999)	Mutability, internal contradictions, and collective learning	Informal knowledge sharing about OTs between DoD OT practitioners
Beland & Powell (2016)	The dependent variable problem: Incremental change; cumulative change; policy drift and conversion	Updated OT Guide (incremental change): DIUx (cumulative change)
Kickert & Van Deer Meer (2011); Blyth (2016)	Layering, displacement, drift, conversion, and exhaustion	Successive OT legislative action (layering); Lack of DoD leadership commitment to OTs (drift)
Sorensen (2015)	Implementation and interpretation of institutional rules; status quo defenders; institutional actors' discretionary authority	DoD OT Guide; GAO/DoD IG audits
Beland & Rocco (2016)	Policy drift	FPDS; BBP 3.0; Cyber Fast Track
Greif (2004)	Quasi-parameters; employee knowledge, attention and coordination costs	DoD OT award approval thresholds
Howlett (2009)	Policy change from power relationships between institutional actors and exogenous lesson-learning; Process sequencing	DoD learning OT practices from other federal agencies; Legislative changes to OT statute
Coombs (1998)	Knowledge management processes	FPDS
Koning (2016)	Ideational institutionalism: Puzzling and learning;	DIUx

	priming and framing change ideas; exogenous crisis	
Jacobs (2015)	Self-undermining feedback: new policy alternatives; negative policy consequences; coalitions for policy change	Local OT agreement templates
Schmidt (2008)	Discursive Institutionalism (DI): employee background ideational abilities, foreground discursive abilities	FAR/DFARS; DoD training conferences
Panizza (2013)	PSDT: Power relationships between institutional actors	Pentagon and Military Department OT delegation and approval requirements
Howlett (2009)	Neo homeostatic and quasi-homeostatic models of policy change	OT templates; legislative changes to OT statute
Peters (2005)	Political conflict	DoD organizations desire for greater delegated authority to award OTs

Source: Chapter 2, Literature Topic Two.

Appendix N. Predetermined Coding Scheme (Factors and Subfactors)

(Note: Predetermined codes are defined in Appendix X)

1. OT SELECTION/NEGOTIATION
 - a. Selection Factors
 - b. Negotiation Success Factors
 - c. Negotiation Failure Factors
2. OT ADVANTAGES v. TPAs
 - a. OT advantages
 - b. Impact on participant's organization
 - c. Impact on DoD
3. OT DISADVANTAGES v. TPAs
 - a. OT disadvantages
 - b. Impact on participants organization
 - c. Impact on DoD
4. NUMBERS OF OT v. TPAs
 - a. Organization factors
 - b. DoD-wide factors
5. WHAT CAN BE CHANGED
 - a. Organization factors
 - b. DoD-wide factors
 - c. Resistance to change factors

Appendix O. FPDS Data Fields and Sample FPDS Data Entry

Field Name	Description	Sample FPDS data
Contracting Agency Name	The name of the DoD agency that awarded the OT—e.g., Army	DEPT OF THE ARMY
Contracting Office Name	The name of the subordinate contracting office that awarded the OT – e.g., Army Contracting Command, Picatinny Arsenal (ACC-PICA)	W6QK ACC-PICA
Principal Place of Performance	State code for the state where OT was performed, e.g., Missouri (MI)	MI
Fiscal Year	DoD fiscal year OT was signed	2008
Completion Date	Date OT was completed	09/30/2011
Funding Agency Name	Name of DoD agency that funded the OT—e.g., Army	ARMY
Contractor Name	Name of OT contractor	NIMBIS SERVICES, INC.
Non-traditional Contractor Participation Code	Two letter code denoting participation type—e.g., Nontraditional Significant Participation (NSP)	NSP
Type of Agreement	Prototype OT or Research OT	PROTOTYPE
Base and All Option Value	Total dollar value of OT, including all options	\$6,487,500
Non-Government Dollars	Total dollar value of OT contractor cost share	\$500,000
Number of Records	Number of records in FPDS-NG about the OT—e.g., 1	1

Source: FPDS (2016).

Appendix P. DoD Organization Summaries

(Note: Organization summary information copied from public websites)

Air Force Research Laboratory (AFRL)

The Air Force Research Laboratory (AFRL) is a global technical enterprise boasting some of the best and brightest leaders in the world. AFRL has several locations, including Wright Patterson Air Force Base, Ohio and Rome, New York. The mission of AFRL is leading the discovery, development, and integration of affordable warfighting technologies for air, space and cyberspace forces. With a workforce of over 10,000 across nine technical directorates and 40 other operations across the globe, AFRL provides a diverse portfolio of science and technology that range from fundamentally to advanced research and technology development. See <http://www.wpafb.af.mil/AFRL/>

This study interviewed one participant from AFRL.

Army Contracting Command, Picatinny Arsenal (PIC)

Picatinny Arsenal is the Joint Center of Excellence for Guns and Ammunition, providing products and services to all branches of the U.S. military. Nestled in the northern New Jersey Highlands, our team of more than 6,000 personnel includes Soldiers, Sailors, Airmen, Marines, U.S. Federal employees and contractor personnel who lead in the research, development, acquisition and lifecycle management of advanced conventional weapon systems and ammunition. Picatinny's portfolio comprises nearly 90 percent of the Army's lethality and all conventional ammunition for joint warfighters. See <http://www.pica.army.mil/Picatinny/about/default.aspx>

The study interview one participant from PIC.

Assistant Secretary of the Air Force (Acquisition) (AFHQ)

The Assistant Secretary of the Air Force for Acquisition (SAF/ACQ) is a civilian office in the Department of the Air Force. The mission of SAF/ACQ is to deliver world-class capabilities to assume air, space and cyberspace dominance for the nation and our allies. SAF/ACQ is located in the Pentagon and is led by the Air Force Service Acquisition Executive (SAE), who is responsible for all Air Force research, development, and non-space acquisition activities. The SAE provides direction, guidance, and supervision of all matters about the formulation, review, approvable and execution of acquisition, plans, policies, and programs. The SAE directs over \$35 billion annual investment that includes major programs like the KC-46, F-22, F-35 and C-17 aircraft, space acquisitions, munitions, and capability areas such as information technology, and command and control, intelligence, surveillance and reconnaissance (C4ISR) systems. The SAE formulates and executes over \$200 billion Air Force investment strategy to acquire systems and support services to provide combat capability to joint warfighting commanders. See <http://ww3.safaq.hq.af.mil/Contracting/>

The study interviewed one participant from AFHQ.

Assistant Secretary of Defense for Research and Engineering (OSD)

The Assistant Secretary of Defense for Research and Engineering (ASD(R&E)) provides science and technology leadership throughout the Department of Defense to meet tomorrow's challenges. The mission of ASD(R&E) is: The United States depends on science, technology, and innovative engineering to not only protect the American people but to advance our national interests and to prepare us to meet the challenges of an uncertain future. Given today's globalized access to knowledge and the rapid pace of technology development, innovation, speed, and agility have taken on greater importance to DoD efforts. ASD(R&E) further publicizes that R&E contributions are critical to the nation's defense. The R&E community has three strategic guiding imperatives:

1. Mitigate current and emerging adversary threats that could degrade U.S. (and allied) capabilities;
2. Affordably enable new or extended capabilities in existing military systems; and
3. Create technology surprise through science and engineering applications to military problems.

ASD(R&E) states that these imperatives complement the seven S&T priorities approved in 2011 by then-Secretary of Defense Robert Gates and give the focus to meet future the Department's technological goals. The ASD(R&E)) provides S&T leadership throughout the Department of Defense; shaping strategic direction and strengthening the research and engineering coordination efforts to meet tomorrow's challenges. See <https://www.acq.osd.mil/chieftechologist/index.html>

The study interviewed one participant from (OSD).

Assistant Secretary of the Navy for Research, Development, and Acquisition (NAVYHQ)

The mission of the Assistant Secretary of the Navy for Research, Development, and Acquisition ASN (RD&A)) is to provide weapons, systems, and platforms for the men and women of the Navy/Marine Corps that support their missions and give them a technological edge over our adversaries. ASN(RD&A) is located at the Pentagon. ASN(RD&A) serves as the Navy SAE. The ASN(RD&A) has authority, responsibility, and accountability for all acquisition functions and programs, and to enforce Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)) procedures. The ASN(RD&A) represents the Department of the Navy to USD(AT&L) and Congress on all matters relating to acquisition policy and programs. The ASN(RD&A) establishes policies and procedures and manages the Navy's Research, Development, and Acquisition activities by DoD 5000 Series Directives. The ASN(RD&A) serves as Program (Milestone) Decision Authority on Acquisition Category (ACAT) IC programs and recommends decisions on ACAT ID programs. See <http://www.secnav.navy.mil/rda/Pages/default.aspx>

The study interviewed one participant from NAVYHQ.

Defense Advanced Research Projects Agency (DARPA)

The Defense Advanced Research Projects Agency (DARPA) was created in 1958 as part of the United States response to the Russian Sputnik satellite. Thus, DARPA was created to make sure that the United States would not again be surprised by technological advancement of potential adversaries (DARPA, 2015). DARPA is located in Arlington, Virginia. DARPA is a defense agency organized under the authority of the USD(R&E) in the Pentagon. The mission of DARPA is to serve as the research and development organization in the Department of Defense with the primary responsibility of maintaining U.S. technological superiority over adversaries (5134.10, 2015). DARPA is responsible for pursuing imaginative and innovative R&D projects with the potential for significant impact on future national security, looking beyond today's needs and requirements. DARPA sponsors revolutionary high risk, high payoff research that bridges the gap between fundamental discoveries and their military use. In fiscal year 2015, DARPA's budget was approximately \$2.9 billion (DARPA, 2015). DARPA has about 250 R&D programs and projects that span a wide range of advanced technologies including mechanical, biological, computer, and strategic systems. Historically, DARPA has been a leader in negotiating and administering OTs. For instance, in 1994, DARPA negotiated and administered the first OT for the prototype project. The OT project was to develop and built the first military UAV, which led to the Global Hawk long-range military UAV (Sommer, United, & National, 1997). Since then, DARPA has negotiated and administered many OTs to develop breakthrough technologies to support national defense.

This study interviewed several participants from DARPA.

Defense Ordnance Technology Consortium (DOTC)

DoD Ordnance Technology Consortium (DOTC) serves as the focal point for armaments system technology research and development. The industrial and academic component of DOTC is the National Armaments Consortium (NAC), which comprises over 500 companies. The DOTC was commissioned by the USD(AT&L) as a DoD initiative. The goal was to facilitate collaborative Government, Industry and Academic ordnance technology development and prototyping. Initially, in 2000 the National Armaments Consortium (NAC) was partnered with the Army's Warheads and Energetics Technology Center, or WETC, located at Picatinny Arsenal in New Jersey. Shortly after the NAC/WETC partnership was forged, the NAC expanded its role and became the industrial/academic component of the newly formed DOTC when it was stood up as a purple organization in December 2002. A key feature of the enterprise is its ability to leverage the capabilities and investments of all of its constituents, Government, Industry, and Academia, to maximize Return on Investment. This is accomplished through its joint planning and project execution process. In operation for the last sixteen years, DOTC is available to all Service laboratories and any other Government Agencies to aid in development and prototyping of advanced concept warheads, energetics, fuzes, and other ordnance items. DOTC operates under Other Transaction Agreements (OTA) (10 U.S.C. 2371b) between the Government and the ATI, the acting NAC Consortium management firm. ATI also serves as a single point contracting agent for the DOTC. This unique model has resulted in over 650 initiatives awarded to NAC

members totaling more than \$3 billion since 2009. See http://www.nwec-dotc.org/About_DOTC.html

The study interviewed one participant from the DOTC.

Defense Pricing/Defense Procurement and Policy Office (DPAP)

Defense Policy/Defense Procurement and Acquisition Policy (DP/DPAP) is located in the Pentagon and is under the supervision of the USD(AT&L). DP/DPAP is responsible for all pricing, contracting, and procurement policy matters, including e-Business, in DoD. DP/DPAP executes policy through the timely update of the Defense Federal Acquisition Supplement and its Procurement Guidance and Instructions. DP/DPAP enables the DoD Components to effectively deliver goods and services that meet the needs of the warfighter, while ensuring a business deal that is in the best interests of the taxpayer by overseeing and implementing business enterprise initiatives related to pricing, formulating and overseeing complex, DoD-wide pricing policies and strategies supporting the procurement of major defense system programs, major automated information systems and service acquisitions for the Department. DP/DPAP also enables DoD Components to effectively deliver equipment and services that meet the needs of the warfighter through innovative policy, guidance, and oversight while being good stewards of the taxpayers' money. See <http://www.acq.osd.mil/dpap/index.html>

The study interviewed one participant from DPAP.

Defense Innovation Unit (Experimental) (DIUX)

In 2015, the Secretary of Defense launched the Defense Innovation Unit (Experimental) (DIUX) to accelerate the development, procurement, and integration of commercially derived disruptive capabilities to regain our nation's technological lead and enabling a third offset strategy. The DIUX mission as The U.S. Department of Defense (DoD) relies on innovation to deter and prevail in conflict. Defense Innovation Unit Experimental (DIUX) increases access to commercial technology, with the ultimate goal of accelerating innovation into the hands of the men and women in uniform. DIUX has two offices: One in Silicon Valley and a second in Boston, Massachusetts. DIUX act as an interface node between the DoD, entrepreneurs, start-up firms, and commercial technology companies in Silicon Valley, California (DIUX West); Boston, Massachusetts (DIUX East); and other U.S. technology hubs to increase DoD access to leading-edge commercial technologies and technical talent (5105.85, 2016, p. 3). DIUX focuses on rapidly delivering militarily useful technologies to warfighters. To accomplish this, it scouts for promising commercial technology and transfers it into the DoD to ensure battlefield advantage for the next generation of warfighters, in the process pioneering procurement and acquisition pathways optimized for start-up firms and non-traditional entrants to the defense industry (5105.85, 2016, p. 3). DIUX exclusively uses OTs to procure militarily useful prototypes from nontraditional contractors. See <https://www.diux.mil/>

The study interviewed one participant at DIUX.

Defense Threat Reduction Agency (DTRA)

The mission of the Defense Threat Reduction Agency (DTRA) is to keep Weapons of Mass Destruction (WMD) out of the hands of terrorists and other enemies by locking down, monitoring, and destroying weapons and weapons-related materials. DTRA also assists the Combatant Commanders with their plans and responses to WMD events, develop, and deliver cutting-edge technologies to assist with these endeavors. DTRA also includes Joint Improvised-Threat Defeat Agency (JIDA). Originally formed to address the threats posed by Improvised Explosive Devices (IED's) in Iraq and Afghanistan, JIDA's mission is to enable the DoD to very quickly address and counter improvised threats, including IEDs, car bombs, armed drones, and more. DTRA is the youngest agency in DoD, but it is also the oldest, pre-dating the Department itself. DTRA was created in 1998 from some other entities to focus their efforts on terrorism, our nuclear surety, and counter-proliferation, but DTRA's rich legacy extends back to the Manhattan Engineering Project that was created to develop the world's first atomic bomb during World War II. After the war, the Manhattan Project continued working on atomic weapons until the Atomic Energy Act of 1946 split the program into two parts: The Atomic Energy Commission (today's Department of Energy) and the Armed Forces Special Weapons Project (AFSWP). The AFSWP was established to conduct military training in nuclear weapon operations. The organization changed over the years (Armed Forces Special Weapons Project, 1947-1959, Defense Atomic Support Agency, 1959-1971, Defense Nuclear Agency, 1971-1996, Defense Special Weapons Agency 1996-1998) and was called the Defense Special Weapons Agency, center for nuclear and advanced weapons effects expertise, when it was combined with other WMD-related agencies and programs in 1998 to form DTRA. See <http://www.dtra.mil/>

The study interviewed one participant from DTRA.

Joint Program Office for Chemical and Biological Defense (PEO-CBD)

The Joint Program Executive Office for Chemical and Biological Defense (JPEO-CBD) is the DoD point for research, development, acquisition, fielding and life-cycle support of biological, chemical and nuclear defense equipment and medical countermeasures to the Army, Navy, Air Force, Marine Corps, and Special Operations Command. JPEO-CBD is located in Aberdeen, Maryland. The mission of JPEO-CBD is to protect DoD forces from weapons of mass destruction by generating affordable capabilities. JPEO-CBD exists to manage the nation's investments in chemical, biological, radiological, and nuclear (CBRN) defense equipment. For example, it provides protective masks to the soldiers walking the streets of a battle-torn country and also to Airmen flying in the skies. It also works closely with various government agencies that need CBRN defense equipment. See <https://www.jpeocbd.osd.mil>

The study interviewed one participant from PEO-CBD.

Missile Defense Agency (MDA)

The Missile Defense Agency (MDA) is a research, development, and acquisition agency within DoD. The MDA's workforce includes government civilians, military service members, and contractor personnel in multiple locations across the United States. The MDA traces its roots

back to the origins of the Strategic Defense Initiative (SDI) program. President Reagan launched this initiative in 1983 to develop non-nuclear missile defenses. The SDI consolidated missile defense programs that were scattered among several Government offices and molded them into a coherent program under the management of the Strategic Defense Initiative Organization (SDIO). As the technologies developed under the original initiative evolved, so did the organization responsible for their management. In 1994, the SDIO was renamed the Ballistic Missile Defense Organization (BMDO). The National Missile Defense Act of 1999 defined the mission for the BMDO while the U.S. withdrawal from the Anti-Ballistic Missile Treaty (ABM) in 2002 lessened the restrictions to develop and test these technologies. In 2002, the BMDO was renamed the Missile Defense Agency. The MDA mission is to develop, test, and field an integrated, layered, ballistic missile defense system (BMDS) to defend the United States, its deployed forces, allies, and friends against all ranges of enemy ballistic missiles in all phases of flight. The MDA works closely with the combatant commands (e.g., Pacific Command, Northern Command, etc.) who will rely on the system to protect the U.S., forward deployed forces, and allies from hostile ballistic missile attack. The MDA works with the Combatant Commanders to ensure that the U.S. develops a robust BMDS technology and development program to address the challenges of an evolving threat. See <https://mda.mil/>

The study interviewed one participant from MDA.

National Spectrum Consortium (NSC)

The National Spectrum Consortium is a spectrum industry consortium collaborating with multiple government agencies through a five year, \$1.25 Billion, Section 815 Prototype Other Transaction Agreement (OTA) with the Office of the Deputy Assistant Secretary of Defense, Emerging Capabilities, and Prototyping (ODASD, EC&P). NSC is now recruiting a broad and diverse membership that includes representatives from large businesses, small businesses, "non-traditional" government contractors, academic research institutions, and not-for-profit organizations. The collaboration between industry and the Government focuses on four major activities:

1. Maturing technologies that assist in improved electromagnetic spectrum awareness, sharing and use
2. Experimentation to better inform the optimal allocation of those technologies for both public and private objectives
3. Demonstration of new technologies to increase trust among spectrum stakeholders.
4. Policy development to ensure technologies don't outpace the appropriate guidance for their best use

Specific industry segments of interest include wireless technologies, radars and signal processing, electronic warfare and spectrum monitoring and sensing. See <https://www.nationalspectrumconsortium.org/>

The study interviewed one participant from NSC.

Space and Naval Warfare Systems Center Pacific (SPAWAR)

Space and Naval Warfare Systems Center Pacific provides the U.S. Navy and military with essential capabilities in the areas of command and control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR), cyber, and space. SSC Pacific is located in San Diego, California. SSC Pacific's workforce also includes the largest number of active-duty military personnel stationed at any naval laboratory or warfare center. SSC Pacific advertises itself as a recognized leader in the cyber domain and cyberspace, and for autonomous unmanned systems, SSC Pacific is providing the technological and engineering support critical to naval information warfare. While most of SSC Pacific's work addresses the Navy's requirements, it actively supports Marine Corps, Air Force, Army, and Coast Guard programs. Other Government agencies, such as the Department of Homeland Security, frequently call on SSC Pacific's technical expertise. Systems development and support includes basic research and prototype development through systems engineering and integration to life cycle support of fielded systems. See <http://www.public.navy.mil/spawar/Pacific/Pages/About-SSC-Pac.aspx>

The study interviewed one participant from SPAWAR.

Strategic Capabilities Office (SCO)

The Strategic Capabilities Office (SCO) advises DoD leadership on the identification, analysis, and introduction of disruptive applications and new and unconventional uses of existing systems and near-term technologies, for both U.S. Government and commercial capabilities, to create operationally, strategic effects, including: (1) Deterrence; (2) Power projection; (3) Cost imposition; (4) Surprise; and (5) Overmatch (5105.86, 2016). SCO develops strategic capability alternatives; vets and recommends to the Deputy Secretary of Defense innovative ideas and concepts for funding or operational execution; conducts demonstrations, experiments, and prototypes through the Secretaries of the Military Departments and the heads of other DoD Components to reduce upfront risk on potentially game-changing concepts that can be fielded in the near-term (0-5 years) fiscal development period; collaborates with the Secretaries of the Military Departments, the Commander Joint Chiefs of Staff, the USD(AT&L), the Under Secretary of Defense for Policy, and the heads of other DoD Components with program offices on alternative strategic capability development and on processes to expedite transition timelines; develops program information management strategies to create deterrence and maintain U.S. strategic advantage; leverages existing DoD relationships with the national security community to coordinate and synchronize efforts; and interfaces, after approval and pursuant to guidance from the Deputy Secretary of Defense, with the international community to identify opportunities for cooperative efforts (5105.86, 2016).

The study interviewed one participant from SCO.

Tank Automotive Research, Development, and Engineering Center (TARDEC)

The mission of U.S. Army Tank Automotive Research, Development, and Engineering Center (TARDEC) is to develop, integrate, and sustain the right technology solutions for all manned and unmanned DoD ground systems and combat support systems to improve Current Force

effectiveness and provide superior capabilities for the Future Force. TARDEC is located in Warren, Michigan. In 1946, the Tank-Automotive Components Laboratory, now known as the TARDEC, was formed at the recommendation of a committee led by Chrysler Corporation's President K. T. Keller. The newly created Components Laboratory spawned many successful collaborative working relationships. TARDEC's Technology Focus Areas are specific topics of interest TARDEC concentrates research efforts. TARDEC provides system engineering, technical expertise, and engineering leadership support across organizational boundaries to these areas with specific technologies to improve the Ground System Enterprise. See <https://www.army.mil/article/128284/>

The study interviewed one participant from TARDEC.

The United States Special Operations Command (SOCOM)

The United States Special Operations Command (USSOCOM) synchronizes the planning of Special Operations and provides Special Operations Forces to support persistent, networked, and distributed Global Combatant Command operations to protect and advance our Nation's interests. USSOCOM is located at MacDill Air Force Base near Tampa, Florida. DoD USSOCOM on April 16, 1987, at MacDill Air Force Base, Florida. Congress mandated a new four-star command be activated to prepare Special Operations Forces (SOF) to carry out assigned missions and, if directed by the president or secretary of defense (SECDEF), to plan for and conduct special operations. Before Sept. 11, 2001, terrorist attacks on the United States, USSOCOM's primary focus was on its supporting command mission of organizing, training, and equipping SOF and providing those forces to support the geographic combatant commanders and U.S. ambassadors and their country teams. The President further expanded USSOCOM's responsibilities in the 2004 Unified Command Plan, which assigned USSOCOM responsibility for synchronizing Department of Defense plans against global terrorist networks and, as directed, conducting global operations. USSOCOM is not dependent on the Army, Navy, Marine Corps or Air Force for its budget or to develop and buy new equipment, supplies or services. USSOCOM has its acquisition authorities so that it can develop and buy special operations-specific equipment, supplies, or services. See <http://www.military.com/special-operations/socom-special-operations-command.html>

The study interviewed one participant from SOCOM.

Appendix Q. Overview of Information Needed to Answer the Research Question

Type of Information	What the Information is Needed	Method of Getting Information
Contextual: To give context and background for the study	DoD organizations' mission and functions. Program information for the case studies	<ul style="list-style-type: none"> • DoD document review
Demographic	Descriptive information about participants	<ul style="list-style-type: none"> • Demographic survey form
Perceptual	Participants remarks about their experiences with OTs	<ul style="list-style-type: none"> • Interviews
Research Question: Why, despite their documented administrative advantages, are OTs only sparingly used by DoD compared to more administratively burdensome traditional procurement agreements?	Information about why, after over 25 years of use by DoD, and given increasing need for access to advanced technology solutions from private industry, OTs continue to be only sparingly compared to traditional procurement agreements	<ul style="list-style-type: none"> • Literature review • DoD document review • Interviews • Case studies
Interview Question 1: What do participants believe are institutional and other factors that influence the decision to use an OT instead of a traditional procurement agreement?	Information about how employees, organizations, and DoD uses an OT and what negotiation and administration factors impact whether the OT is successful	<ul style="list-style-type: none"> • Literature review • DoD document review • Interviews • Case studies
Interview Question 2: What do participants believe are the advantages of OTs compared to traditional procurement agreements?	Information about what are the specific employee, organizational and DoD-wide advantages of OTs and how these advantages translate into the wider use of OTs by DoD	<ul style="list-style-type: none"> • Literature review • DoD document review • Interviews • Case studies
Interview Question 3: What do participants believe are the disadvantages of OTs	Information about what are the specific employee, organizational and DoD-wide	<ul style="list-style-type: none"> • Literature review • DoD document review • Interviews

compared to traditional procurement agreements?	disadvantages of OTs and how these advantages translate into lesser use of OTs by DoD	<ul style="list-style-type: none"> • Case studies
Interview Question 4: What do participants believe explains the numbers of OTs compared to traditional procurement agreements?	Employee, organizational, and DoD-wide information that explains the persistent disparity between the numbers of OTs and traditional procurement agreements	<ul style="list-style-type: none"> • Literature review • DoD document review • Interviews • Case studies
Interview Question 5: What do participants believe are factors that could be changed to impact DoD use of OTs?	Information about employee, organizational, and DoD-wide factors that could be changed to result in wider use of OTs by DoD, and specific factors resistant to change	<ul style="list-style-type: none"> • Literature review • DoD document review • Interviews • Case studies

Source: Author.

Appendix R. Participant Consent Form

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Title of Project: Historical institutionalism and defense public procurement: The case of other transactions agreements

Investigator(s): Crane Lopes

Name E-mail / Phone number: cranel@vt.edu/571-239-5084

I. Purpose of this Research Project

The purpose of this research project is to explore a sample of DoD officials' perceptions of factors that have impacted DoD use of Other Transaction Agreements (OTs). The project will include interviews of about 15 legal, contracting and program personnel at DoD organizations that recorded OTs in fiscal years 2011-2015. Case studies of OTs identified by interviewees will be used to corroborate the interviews. The project will review DoD OT policies and organization documentation identified by interviewees. It is anticipated that by gaining a better understanding of the factors that have impacted DoD use of OTs that policy recommendations can be made that may contribute to the wider use of OTs by DoD. The results of the project may be used for publication. Your private information will not be included in any policy recommendations or published results of the research project.

II. Procedures

Your participation in this research project is entirely voluntary. You may withdraw from the project at any time. Should you agree to participate, you will be asked to participate in a 60-minute audio-recorded interview. The interview will be conducted at the time and location of your choice. The interview will be conducted by the investigator, in person or telephonically, depending on the time and location you choose. Following the interview, the investigator will ask you to assist him to identify OTs that you believe would be suitable case studies for the project. The investigator may subsequently ask you for documentation to help him research the OT case studies you identified, and he may also contact you to discuss the case studies.

III. Risks

No risks or discomforts to you are anticipated.

IV. Benefits

It is anticipated that by gaining a better understanding of the factors that have impacted DoD use of OTs that the research project can make policy recommendations that may contribute to the wider use of OTs by DoD.

No promise or guarantee of benefits has been made to encourage you to participate.

V. Extent of Anonymity and Confidentiality

You will be asked to voluntarily provide some basic demographic information about your work duties and work experience. You will also be asked to provide your name, work email address,

work telephone number and work address. The investigator will store all information you provide on an encrypted computer drive. Information used in the project findings and recommendations will not include your name or other private information. The investigator will be the only person who has access to your private information. At no time will the investigator release identifiable results of the research project to anyone other than individuals working on the project without your written consent. However, the Virginia Tech (VT) Institutional Review Board (IRB) may view the research project's data for auditing purposes. The IRB is responsible for the oversight of the protection of human subjects involved in research.

VI. Compensation

You will earn no compensation for participating in this research project.

VII. Freedom to Withdraw

It is important for you to know that you are free to withdraw from this research project at any time without penalty. You are free not to answer any questions that you choose, or to not respond to what is being asked of you, without penalty.

Please note that there may be circumstances under which the investigator may determine that a subject should not continue as a subject.

Should you withdraw or otherwise discontinue participation, you will be compensated for the portion of the project completed in accordance with the Compensation section of this document.

VIII. Questions or Concerns

Should you have any questions about this research project, you may contact the research investigator whose contact information is included at the beginning of this document.

Should you have any questions or concerns about the research project's conduct or your rights as a research subject, or need to report a research-related injury or event, you may contact the VT IRB Chair, Dr. David M. Moore at moored@vt.edu or (540) 231-4991.

IX. Subject's Consent

I have read the Consent Form and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent:

_____ Date _____
Subject signature

Subject printed name

Appendix S. Demographic Survey Form

Thank you for agreeing to participate in this research project. Please complete the survey below and return it to the researcher at crane.lopes@darpa.mil or cranel@vt.edu.

Please note that the information collected in this data sheet is completely confidential and will only be used for purposes of this research project.

Name:

Work phone number:

Work email address:

DoD organization:

Gender:

Age: 21-30__ 31-40 __ 41-50__ 50+__

Job title:

Grade:

For contracting officers, warrant level:

Job location:

Number of years of experience in the job:

Approximate number of OTs you have negotiated or administered:

Appendix T. OT Case Study Identification Form

Date:

Name:

DoD Organization:

The researcher is interested in identifying OT case studies for further research. The researcher is particularly interested in OTs that illustrate how factors at your organization impacted the use of OTs compared to traditional procurement contracts, grants, and cooperative agreements.

- What are some notable OTs that you have worked on?

- Why were these OTs notable?

- When and where did these OTs take place?

- Do you have documents about these OTs that you are willing to share with the researcher?

- Do you have contact information for the OT program manager/office that you will share with the researcher?

- May the researcher contact you again if he needs further information about these OTs?

Appendix U. Interview Protocol

DATE:

PLACE:

INTERVIEWER:

INTERVIEWEE:

PURPOSE OF INTERVIEW/INTRODUCTION:

The purpose of this interview is to learn about your perceptions of how your DoD organization uses OTs. During this interview, I will ask you a total of about 20 questions about OTs in 5 main questions areas. There are no right or wrong answers to the questions. I will use your responses to the questions as part of my overall study of use of OTs. Your private information, for instance, your name or other private information, will not be published. I plan to tape record this interview. After the interview, I will provide you a transcript of the interview so that you can review it for content and accuracy. I will not publish the interview transcript. The interview will take about 1 hour. You can stop anytime, for instance, to take a break. I will give you an opportunity to ask me questions at the end of the interview.

DO YOU HAVE ANY QUESTIONS BEFORE WE BEGIN THE INTERVIEW?

2. What do participants believe are factors that influence the decision to use an OT instead of a traditional procurement agreement?

- a) How does your organization determine to select an OT instead of a traditional procurement agreement such as a contract, grant, or cooperative agreement?
- b) If you select an OT, what factors can influence negotiations to succeed?
- c) If you select an OT, what factors can influence OT negotiations to fail?

4. What do participants believe are the advantages of OTs compared to traditional procurement agreements?

- d) What are the advantages of using OTs compared to traditional procurement agreements such as contracts, grants, and cooperative agreements?
- e) How do the advantages of OTs contribute to the wider use of OTs in your organization?
- f) How do the advantages of OTs contribute to the wider use of OTs in other DoD organizations?

5. What do participants believe are the disadvantages of OTs compared to traditional procurement agreements?

- d) What are the disadvantages of using OTs compared to traditional procurement agreements such as contracts, grants, and cooperative agreements?
- e) How do disadvantages of OT contribute to the lesser use of OTs in your organization?
- f) How do disadvantages of OTs contribute to the lesser use of OTs in other DoD organizations?

6. What do participants believe explains relatively low use of OTs compared to traditional procurement agreements?

- d) What factors in your organization explain the number of OTs executed compared to traditional procurement agreements such as contracts, grants, and cooperative agreements?
- e) What DoD factors help explain the numbers of OTs compared to traditional procurement agreements?
- f) What are the major factors that help explain the numbers of OTs compared to traditional procurement agreements?

7. What do participants believe are factors that could be changed to result in wider use of OTs?

- d) What factors in your organization could be changed to result in the wider use of OTs?
- e) What DoD factors could be changed to result in the wider use of OTs?
- f) What factors do you believe are resistant to change, but if changed, would result in the wider use of OTs?

WHO SHOULD I VISIT TO LEARN MORE ABOUT MY QUESTIONS?

DO YOU HAVE ANY FINAL QUESTIONS?

Thank you for participating in my interview. As I discussed at the start, I will provide you with a copy of the interview transcript, which I would like you to review for content and accuracy. Return the edited transcript to me so that I can ensure that I have accurately recorded your interview remarks.

Appendix V. List of Potential OT Case Studies

Source of information*	Potential OT case studies and OT status
Researcher's field notes (DARPA)	<ul style="list-style-type: none"> • Multi-Chip Module (MCM) consortium OT–failure • Blue Angel–success • Global Hawk–success • Future Combat Systems (FCS) (Army) – failure • Heliplane–failure • Hypersonic Technology Vehicle (HGV) 1 and 2 – technical failure • Tern – ongoing and successful • Aircrew Labor In-cockpit automation system (ALIAS)–ongoing and successful
Participant 1 interview (DARPA)**	<ul style="list-style-type: none"> • Micron–success • Nokia–success • Honeywell–success • Robotic Servicing of Geosynchronous Satellites (RSGS)–ongoing and successful***
Participant 3 interview (AFRL)	<ul style="list-style-type: none"> • Open System Acquisition Initiative (OASI) – ongoing and successful
Participant 4 interview (DARPA)	<ul style="list-style-type: none"> • Extreme Accuracy Tasked Ordnance (EXACTO)–success • IMPROV–success
Participant 5 interview (DARPA)	<ul style="list-style-type: none"> • Blast Gauge–success**** • Living Foundries–ongoing and successful***
Participant 6 interview (DIUx)	<ul style="list-style-type: none"> • AI Shield–under negotiation
Participant 7 interview (AFHQ)	<ul style="list-style-type: none"> • Rocket engine OTs (4) for the Air Force Evolved Expendable Launch Vehicle (EELV) program–success
Participant 10 interview (PIC)	<ul style="list-style-type: none"> • Cyber Challenge (2 OTs)–ongoing and successful

Participant 11 interview (NSC)	<ul style="list-style-type: none"> • Defense Ordnance Technology Consortium (DOTC) OT (Army)—ongoing and successful
Participant 12 interview (DTRA)	<ul style="list-style-type: none"> • Soldier wearable health diagnostics technology—OT award pending
Participant 14 interview (DOTC)	<ul style="list-style-type: none"> • DOTC OT—ongoing and successful • Vertical Lift Consortium OT—ongoing • National Spectrum Consortium OT—ongoing and successful
Participant 15 interview (TARDEC)	<ul style="list-style-type: none"> • Ground Vehicle Systems OTA—ongoing and successful
Participant 17 interview (SCO)	<ul style="list-style-type: none"> • Sea Dragon—ongoing and successful • Overlord—OT award pending
Participant 18 interview (PEO-CBD)	<ul style="list-style-type: none"> • Medical Chemical Biological Radiological Nuclear (CBRN) consortium OT—ongoing and successful
Participant 19 interview (SOCOM)	<ul style="list-style-type: none"> • Selective Laser Melting (SLM) lightweight body armor OT—recently awarded
Participant 20 (DPAP)	<ul style="list-style-type: none"> • DIUx Commercial Services Ordering Process

Source: Participant interviews.

* Participants 2, 8, 9, 13 and 16 identified no potential OT case studies.

** Pilot interview.

*** Researcher selected the OT as a case study.

**** Researcher used this as a sample OT. See Appendix B.

Appendix W. Coding Scheme Development Record

Developmental phase of the analytical framework	Description of changes to the coding scheme
v1.0–initial coding scheme: October 2016. The initial coding scheme developed for the prospectus was based on a review of the policy diffusion and public procurement of innovation literature. The coding scheme was also informed by the OT practitioner literature.	The initial coding scheme was developed based on the researcher’s initial ideas about a conceptual framework for the prospectus. The initial coding scheme was informed by coding discussion in McNabb (2008), Bloomberg (2008), and Creswell (2014).
v2.0–updated coding scheme: October 2016. Coding scheme updated based on updates to research questions.	The updated coding scheme is based on revisions to the research questions. The coding scheme is evolving as the researcher learns more about OTs and the relevant policy diffusion and public procurement of innovation literature.
v3.0–updated coding scheme: November 2016. Based on an October 16, 2016, meeting with Dr. Roberts, changed literature topics to historical institutionalism and OT practitioner literature. Updated the coding scheme based on a preliminary review of historical institutionalism literature.	The coding scheme is evolving, but it is still in a rudimentary stage. The coding scheme follows the research questions, with one coding theme for each research question and four codes under each theme.
v4.0–updated coding scheme: November 2016. Updated coding scheme before the concentration lecture to account for ongoing historical institutionalism literature.	The coding scheme was updated as part of preparing for the concentration lecture on December 2, 2016.
v5.0–updated coding scheme in mid-December 2016. Coding scheme updated based on feedback from concentration lecture. New research question added based on concentration lecture feedback from Dr. Jensen. Other four research questions re-drafted to more align them with eliciting information that will help explain why OTs are not more widely used by DoD.	The coding scheme was revised based on new research questions and given the discussion in Campbell (2013) and Graneheim and Lundman (2004). The revised coding scheme will be tested using interview transcripts from the pilot interviews.

<p>v6.0—updated coding scheme in February 2017 based on feedback and comments by Professor Roberts on the draft prospectus. This coding scheme will be used to help develop the conceptual framework for the study.</p>	<p>Simplified the coding scheme to focus on generic factors common to all interview questions—e.g., employee factors, DoD factors, etc. The researcher will try to code interview transcripts and field notes to help answer the research question.</p>
<p>v7.0—updated coding scheme in July 2017 based on drafting the literature review chapter (Ch. 2), initial interviews and conceptual framework.</p>	<p>Added sub-codes to v6.0 coding scheme. These sub-codes will be used on the initial interview transcripts to evaluate the sub-codes for usefulness. The sub-codes were developed using the current version of the study's conceptual framework.</p>
<p>v8.0—updated coding scheme in August 2017 based on preparing conceptual framework (Ch. 2), participant interview data collected to date, and given the ongoing literature review.</p>	<p>Numbered the coding factors and subfactors to follow interview questions. Drafted coding factor/subfactors narrative descriptions to use for study research design. Changed organization sub-code (5.b) "type of organization" to "organization subculture" based on participant data collected during first ten interviews. Have not collected any data concerning the type of organization but have collected data concerning organization culture. Will have to re-code interviews given new sub-code 5.b.</p>
<p>v9.0—revised coding scheme in November 2017 based on initial practice analysis of coding results for interviews 8-10. This is consistent with Creswell (2014), which teaches that the coding scheme for a qualitative study must be updated to reflect emergent data from field research.</p>	<p>Based on a first trial run of analyzing interviews using the coding system, found that the coding is difficult to correlate to interview questions. Revised coding scheme for coding factors to follow interview questions, with subfactors for each question correlated to relevant literature from the literature review. Used revised coding scheme to analyze interviews 8-10. Appeared to generate useful information for identifying themes. Need to re-code interviews 1-10 to follow new coding scheme and update conceptual framework discussion and tables in draft Ch. 2.</p>
<p>v10.0—revised coding scheme in December through February 2018 to add emergent sub-codes based on the initial coding of RSGS and case studies participant interview</p>	<p>Appendix Z is the final coding scheme. It provides all emergent sub-codes and descriptions. Appendix X provides</p>

<p>transcripts using predetermined codes and sub-codes. Re-coded all interview transcripts using these emergent sub-codes. The purpose of identifying emergent sub-codes and re-coding interview transcripts was to develop reliable findings from the organization interviews (Chapter 4) and the OT case studies interviews (Chapter 5).</p>	<p>predetermined coding scheme factors and subfactors descriptions.</p>
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Source: Author.

Appendix X. Predetermined Coding Scheme Factor and Subfactors Descriptions

1. **OT AWARD FACTORS** – OT selection and negotiation factors such the project, OT negotiation success factors such as the collaboration between the OT parties, and OT negotiation failure factors such as poor communication between the parties.
 - a. Selection Subfactors–Factors that may impact the selection of an OT instead of a TPA, including the project, the need for flexibility on terms and conditions, and the experience of the Government and contractor personnel that will be involved in negotiating the OT.
 - b. Negotiation Success Subfactors–Factors that may impact the OT negotiation to succeed, including communication between the parties, being flexible on terms and conditions, and collaboration between Government and contractor personnel involved in negotiating the OT.
 - c. Negotiation Failure Subfactors–Factors that may impact the OT negotiation to fail, including unrealistic demands by the contractor, the Government imposing inflexible terms, and poor communication between the Government and contractor personnel involved in negotiating the OT.
2. **OT ADVANTAGES v. TRADITIONAL PROCUREMENT AGREEMENTS (TPAs) FACTORS** – OT advantages such as flexibility, OT advantages impact on the DoD organization such as contractor cost sharing, and DoD-wide OT advantages such as attracting new types of contractors to do business with DoD.
 - a. OT Advantages Subfactors–Factors that may be advantages of OTs over TPAs, including flexibility and enabling DoD to enter into agreements with consortiums.
 - b. DoD Organization Subfactors–Advantages of OTs that may impact a DoD organization, including contractor cost sharing and follow-on noncompetitive production contracts.
 - c. DoD-Wide Subfactors–Advantages of OTs that may have a DoD-wide impact, including attracting new types of contractors to do business with DoD and enhanced access to private industry's advanced technology capabilities and know-how.
3. **OT DISADVANTAGES v. TPAs FACTORS**–OT disadvantages such as lack of OT templates, OT disadvantages impact on the DoD organization such as lack of employees with OT experience, and DoD-wide OT disadvantages such as lack of OT administrative safeguards.
 - a. OT Disadvantages Subfactors–Disadvantages factors of OTs compared to TPAs, including lack of OT templates, OTs take more time to negotiate, and OTs start with a blank sheet of paper.

- b. DoD Organization Subfactors–Disadvantages factors of OTs that may impact a DoD organization, including lack of employees with OT experience and OTs are not well suited for some organizational mission needs,
 - c. DoD-Wide Subfactors–Disadvantages factors of OTs that may have a DoD-wide impact, including lack of OT administrative safeguards and OTs are a specialized procurement tool that can only be used for R&D projects.
4. **NUMBERS OF OT v. TPAs FACTORS**–DoD organization factors such as employees’ habitual preference for TPAs, and DoD-wide factors such as lack of OT training opportunities.
- a. DoD Organization Subfactors–DoD organization factors that may impact the organization’s numbers of OTs versus TPAs, including employees’ risk aversion and habit and effective OT negotiations and administration requires employees with specialized experience in OTs.
 - b. DoD-Wide Subfactors–DoD-wide factors that may impact the numbers of OTs versus TPAs, including lack of OT training opportunities and leadership support for OTs.
5. **WHAT CAN BE CHANGED FACTORS**–DoD organization factors such as delegating greater authority to employees, DoD-wide factors such as leadership support for OTs, and resistance to change factors such as a DoD procurement culture that punishes failure.
- a. DoD Organization Subfactors–DoD organizations changes that may impact the numbers of OTs, including delegating greater authority to employees and encouraging peer support between employees tasked with negotiating and administering OTs.
 - b. DoD-Wide Subfactors–DoD-wide changes that may impact the numbers of OTs, including leadership support for OTs and publishing additional OT policy and guidance.
 - c. Resistance to Change Subfactors–Resistance to change factors that may impact the numbers of OTs, including a DoD procurement culture that punishes failure and fiscal restrictions on using OTs.

Appendix Y. Themes and Emergent Sub-Codes for Interview Question 3

Interview Question 3: What do participants believe are the disadvantages of OTs compared to TPAs?

Interview Question 3a (Q3a): What are the disadvantages of using OTs compared to TPAs such as contracts, grants, and cooperative agreements?

Q3a: Themes from Review of Interview Transcripts:

EXP:

- knowledge and experience of the government employees is a challenge when negotiating an OT
- it is a challenge to bring the level of our contracting officers up to the level of the attorneys that private-sector uses for OT negotiations
- if the contractor is inexperienced, they can treat the entire transaction like a commercial contract, and that will not work
- both parties have to be flexible and negotiate. Unrealistic expectations can doom negotiations
- there is no (OT) template; it is just a blank sheet of paper; this can be really daunting for new people
- you are drafting (OT) terms from scratch
- there is a lack of OT experts in the government
- there is not a large supply of experienced contracting officers
- there is not a lot of expertise at most commands to do OTs
- you have to have a full understanding of OT authority before dabbling in this area
- inexperienced people should not do OTs
- finding an experienced contracting officer can be daunting
- an organization will not want to give up its experienced contracting officers to do OTs
- not a lot of people know about OTs how to use them
- contracting officers are not inclined to use OTs because they lack training about them
- OTs can be burdensome to negotiate for the government and the contractor because of unfamiliarity
- there are no training opportunities (for OTs)
- there is no experience base for OTs
- even though there is an OT Guide, there is not the experience across the DoD contracting agencies, and everyone is going to reinvent the wheel when they do an OT, back to give us another black eye like FCS
- OTs do not have clear boundaries, you can find yourself in the dispute you could have prevented
- there is a misperception OTs save time; they do not
- there is no structure, no sure road ahead with OTs
- trying to use OTs for something they are not meant to do is not good

NEG:

- The first OTs take a long time to negotiate
- you have to have the right experts in the room to protect the government's interests
- The government can impede you with a competitor because of patents (too much government patent rights)
- if you think through things, in the beginning, an OT works really well
- sometimes data rights and conflicts of interest are a problem (in OT negotiations)
- not understanding the (OT negotiation) process or taking the time to make it work well
- trying to go too quickly (in OT negotiations)
- contracting officers may have too much (OT) authority
- the OT is only as good as the contracting officer negotiating it
- program managers, not contracting officers, should negotiate OTs
- there is a single point of failure: the agreements officer
- consortium OTs charge a 4% pass-through fee
- some money paid to the consortium goes to other contractors
- for such a high pass-through fee, I want some accountability and responsibility on the part of the consortium
- there is a fee involved with using consortium OTs
- we have to keep a good standard of competition (for awarding OTs), so we don't look like an old boys' club
- people want to go fast; so, they see the (OT) cost share and nontraditional requirement as a barrier
- OTs are not for everything
- it can take a long time to set up a consortium OT, over 14 months
- Manpower requirements for (OT) negotiation are an order of magnitude higher
- much higher level of expertise, seasoned contracting professionals required (to negotiate an OT)
- the dark side of flexibility is you have enough flexibility to do something stupid
- you are crafting them from whole cloth (OTs)
- OTs present all sorts of risk
- we (the government) cannot protect our equities (in an OT)
- there is little control of the acquisition process in an OT, and this causes people not want to use them
- we (the government) do not get a good cost breakdown in OTs, especially for subcontractors
- there is no way for us (the government) to see where the money goes (in an OT)
- there is a misperception that no FAR clauses apply (to OTs). You still have to draft terms and conditions to protect the government
- it takes more time to negotiate an OT, especially with a nontraditional
- you are often working with a contracting officer who is not familiar with OTs
- contractors also have a bureaucracy, and it can slow down (OT) negotiations
- (OT) negotiations have a whole life cycle; it takes time

- the only way you can go fast is if you have a nontraditional who is just one guy and does not have a staff and is disinterested and not risk-averse
- cost-sharing can disincentive large contractors from doing business with the government
- we're spending more time to make sure everything is locked down, and there are no gaping holes (in the OT)
- people who are not involved in the (OT) negotiation may not understand the terms and conditions, for instance, IP
- it is a lot of effort to get an OT in place
- contractors think it is going to be a quick process (OT negotiations); it is not
- you have to think through how are you going to protect the government's equities
- you have to deliberate about every sentence (of an OT), and that can be off-putting
- you are starting with a blank document (with an OT); you are going to be using potentially language that has never been tried and tested before
- OTs can be burdensome to negotiate
- you are free to ignore mistakes made in the past (in negotiating an OT)
- big contractors do not like the 1/3 cost share (requirement of OTs)
- there is no way to quantify the benefits of OTs in dollars
- there are no quantitative metrics (for OTs)
- it is hard to make the case that OTs are beneficial
- there is only anecdotal evidence about the benefits of OT
- there is a large repository of lessons learned about traditional contracts; not so for OTs
- you can overlook the back end of the agreement with an OT, such as logistics and support and environmental issues noise and such. You can miss important things about post-award issues
- they (OTs) do not scale as well as the FAR, traditional procurement agreement scale well for large systems
- traditional contracts have the FAR system which acts as guardrails to prevent catastrophic bad deals
- you cannot do a 2nd production run for procurement (in an OT)
- there are no downsides (to OTs)

CUL:

- OTs have a lot of unknowns in contrast to the FAR
- the unknown keeps people from trying new things (like OTs)
- we all grew up in a FAR-based world
- people are more comfortable with FAR-based contracts
- I think it is just the unknown (OTs); that is a disadvantage
- some people do not believe that OTs are really what they say they are they just cannot believe it
- people are not familiar with them (OTs); they are familiar with FAR-based contracts
- they want to do what they have always done (TPAs)
- people have been unreal expectations about what you can do with an OT
- FCS still haunts the OT program; OTs are riskier because you are not bound by the FAR

- lack of experience (with OTs) can lead to FAR-minded thinking
- if we break the (OT and procurement) rules, Congress or leadership will tighten up the rules that could happen
- OTs are perceived as the wild west and ripe for corruption fraud waste and abuse
- OTs are not routine; you just cannot go pick up another contract that was written before and cut-and-paste it
- contracting officers will do something they are familiar with, traditional agreements
- the biggest impediment is habit—we use the same old boilerplate and were used to it—you cannot take shortcuts with OTs
- some people believe that OTs do not give you as much protection as a regular contract

Q3a: Emergent Sub-Codes Based on Grouping Themes:

EXP—Experience disadvantages of OT compared to TPAs

NEG—OT negotiations and administration disadvantages of OTs compared to TPAs

CUL—Organization culture disadvantages of OTs compared to TPAs

Interview Question 3b (Q3b): How do disadvantages of OTs impact use of OTs in your organization?

Q3b: Themes from Review of Interview Transcripts:

EXP:

- some people want to only have traditional contracts with the large contractors
- we are always rush to do things and so were always interested in taking a shortcut there is no shortcut with OTs
- it takes a lot of time to set up (an OT)
- not understanding the (OT) process or wanting to take time to set the process up; I think that the biggest problem
- even after briefing people about OTs, they were still pretty reluctant
- at first, it (OTs) did not work; we did not have a path ahead
- we just do not have a lot of experience with it (OTs)
- it takes a lot of effort to get in place (OTs)
- we had a lot of lessons learned from the first one (OT) that will help us
- there is not that level of expertise (OTs) that is not typically found within a command
- people from the (Navy) labs have never heard of it (OTs)

NEG:

- OTs take a long time, and we fell behind schedule
- for small companies, the (OT) negotiations tend to take a lot of time because of the lack of experience
- small companies treat the whole thing (OT negotiations) like a commercial transaction
- we have significant support for new contracting officers on OTs to gain experience

- contractors will propose (OT) terms and conditions we cannot accept
- if a contractor treats the OT like a commercial transaction, it can defeat negotiations
- they (OTs) take more time, but you just have to put your mind to it and go through that learning process
- they (OTs) are not administered correctly if you try to fit a square peg into a round hole, and vice versa
- people want to use an OT because they think it is faster, not for prototype; this is wrong

CUL:

- we all grew up in the FAR-based world
- no one is raising their hand to try something new (like an OT)
- the unknown is scary
- it takes a special type of person to think out-of-the-box
- there is a lot of hesitancy (about OTs)
- in the beginning, there was some resistance to using OTs
- there is a fear you are going to do something wrong
- there is a fear you will do something with legal ramifications (in an OT)
- some people fear IG audits
- there is fear of the unknown—contracts may be more complicated, but we are familiar with them
- I think that OTs are illegal and we're not going to do them
- they (OTs) certainly take more time and effort, but if our customers asked for it will do it
- how can an (OT) guide be seen as prescriptive?
- there is another version of the (OT) guide that was non-published; it was more flexible
- we try to educate our clients and make sure they are using OTs for proper purposes
- if we can do it under a regular contract, we will; we look at OTs as a last resort
- our first decision is to do it is a FAR contract if it is absolutely impossible to do a regular contract we might consider an OT
- people are busy and think they can get more done in less time if they do not use OTs
- you cannot do an OT just by habit; you cannot rely on muscle memory

Q3b: Emergent Sub-Codes Based on Grouping Themes:

EXP—Organization experience impacts of OT disadvantages

NEG—OT negotiation and administration impacts of OT disadvantages

CUL—Organizational culture impacts of OT disadvantages

Interview Question 3c (Q3c): How do disadvantages of OTs impact use of OTs in other DoD organizations?

Q3c: Themes from Review of Interview Transcripts:

EXP:

- we still come across people in the Navy and Army who say, you know I have never heard of these things (OTs), what are you talking about?
- there is really not a lot of education out there (on OTs)
- the only thing that prevents people from using OTs is a lack of education I think the more they know about it, the more they want to use it
- there is a lack of understanding about OTs
- people do not know the benefits of OTs or how to set it up. There are all kinds of uncertainties when you are dealing with OTs
- OTs exist, but they are not readily use because a lot of people really know about them
- lack of sharing best practices and clear guidance with examples (of OTs)
- there is no good training out there (on OTs), and this is just a tiny part of your workload
- it (OTs) takes more time, and you do not have a structured approach
- there is no way of explaining what you did (in an OT) by resorting to the FAR or other regulations
- this (OTs) is not a big part of most organizations business, and they are fearful of just slow everything down
- there is no training (on OTs); it is not a tool in the toolbox right now; it might change in the future, but right now there are no immediate thoughts on how to use OTs
- they (DoD) do not have educated contracting officers they know about OTs
- there is not a lot of warranted agreement officers (that know about OTs)

NEG:

- it takes a lot of brainpower in intensive time to do those OT negotiations
- not all DoD organizations have delegated OT authority
- there are no templates for OTs, there is the OT Guide, but there is no practical way of just jumping in
- you are starting with a blank sheet of paper (on an OT); it can be daunting
- here at DARPA we have the resources and people who actually know about this (OTs)
- OT templates would be helpful
- (OT) consortiums tend to compete with each other and make it more inefficient
- There is no requirement for contracting officers to sign the OT
- the OT Guide does not apply to DARPA or other organizations

CUL:

- people think we're trying to take their job (by doing and OT), that you are trying to take on inherently governmental work
- program managers assert those are their duties (identifying project requirements), don't take them
- I have not talked other people (about OTs); I just kept my head down and moving like a freight train
- throughout the Navy we do not use it (OTs); our labs do not use them very often

- there is a significant concern (about OTs) that there may be a lot of abuses
- OTs are very risky; there is bad press about them
- contracting officers do not know enough (about OTs) and therefore are stuck in their way of doing business because they do not see the advantages of OTs, or maybe it is a control thing; there is less control (in an OT)
- contracting officers are fearful of OTs because it is easier to do what you know
- you are going to be hard-pressed to get contracting professionals to embrace this (OTs), let alone program manager
- there is a lack of good advertising about OTs
- for organizations that have no advocate or understanding of OTs, it is more challenging
- there are entrenched bureaucracies that have stakeholders that want to protect their stakes and sometimes an OT will bypass that
- there is a lot of infrastructure in place in bigger organizations and bureaucracies in those places, and stakeholders just want to give up their turf
- there is a fear of ignoring lessons learned very hard in the past (under TPAs)
- there is rigid enforcement by management because of the nature and dollar size agreements
- there is a perception that OT terms favor the contractor and that OTs may expose the government to legal risk and erode public trust
- we have to change the audit and risk culture around DoD procurement
- the disadvantage is we probably look at OTs as a last resort
- if it is impossible to do a TPA, only then we do an OT
- no idea (of the impact of the disadvantages of OTs)
- bureaucratic organizations have long memories, and we remember FCS
- every time I brief a general officer or senior official they ask about FCS
- a lot of aversion to OTs comes from the FCS experience
- one reason I think we keep using traditional contracts is that when you only have a hammer, everything looks like a nail the FAR mindset is a hammer
- there is no formal communication between the requirements community and the procurement community, and this causes disconnects; the only thing all these people really know is the FAR; they do not know that an OT is a tool in the toolbox
- you have to allow people to fail (on OTs)
- the spike is never going to go away just have to keep shifting it to the right out of fear get past the spike just train them to do them build up a level of confidence (to do OTs)
- there is a lot of fear of the audit factor (with OTs)
- the military services tend to have traditional (procurement) contracts
- learning something new (OTs) takes time, and people are busy

Q3c: Emergent Sub-Codes Based on Grouping Themes:

EXP–DoD experience impacts of OT disadvantages

NEG–DoD negotiation and administration impacts of OT disadvantages

CUL–DoD culture impacts of OT disadvantages

Appendix Z. Final Coding Scheme: Predetermined Codes/Sub-Codes and Emergent Sub-Codes

<p>Interview Question 1: What do participants believe are institutional and other factors that influence the decision to use an OT instead of a traditional procurement agreement (TPA)?</p>
<p>Interview Question 1a: How does your organization determine to select an OT instead of a TPA? Conceptual Framework Category: OT Award Predetermined Code: OT AWARD* Predetermined Sub-Code: OT SELECTION*</p> <p>-----</p> <p>Emergent Sub-Codes: ADMIN–Administrative factors potentially impacting whether to select an OT instead of a TPA CONTR–Contractor factors potentially impacting whether to select an OT instead of a TPA DOD–DoD-wide factors potentially impacting whether to select an OT instead of a TPA LEGAL–Legal/policy factors potentially impacting whether to select an OT instead of a TPA ORG–Organization factors impacting whether to select an OT instead of a TPA</p>
<p>Interview Question 1b: If you select an OT, what factors can influence negotiations to succeed? Conceptual Framework Category: OT Award Predetermined Code: OT AWARD Predetermined Sub-Code: OT NEGOTIATION SUCCESS</p> <p>-----</p> <p>Emergent Sub-Codes: CONTR–Contractor factors potentially influencing OT negotiations to succeed JOINT–Joint organization/contractor factors potentially influencing OT negotiations to succeed LEGAL–Legal/policy factors potentially influencing OT negotiations to succeed ORG–Organization factors potentially influencing OT negotiations to succeed</p>
<p>Interview Question 1c: If you select an OT, what factors can influence negotiations to fail? Conceptual Framework Category: OT Award Predetermined Code: OT AWARD Predetermined Sub-Code: OT NEGOTIATION FAILURE</p> <p>-----</p> <p>Emergent Sub-Codes: CONTR–Contractor factors potentially influencing OT negotiations to fail JOINT–Joint organization/contractor factors potentially influencing OT negotiations to fail LEGAL–Legal/policy factors potentially influencing OT negotiations to fail ORG–Organization factors potentially influencing OT negotiations to fail</p>

* Predetermined codes and sub-codes are defined in Appendix X.

Interview Question 2: What do participants believe are the advantages of OTs compared to traditional procurement agreements?

Interview Question 2a: What are the advantages of using OTs compared to traditional procurement agreements such as contracts, grants, and cooperative agreements?

Conceptual Framework Category: OT Advantages versus TPAs

Predetermined Code: OT ADVANTAGES v. TPAs*

Predetermined Sub-Code: OT ADVANTAGES*

Emergent Sub-Codes:

FLEX–Flexibility advantages of OTs compared to TPAs

SPD–Speed and efficiency advantages of OTs compared to TPAs

ORG–Organization advantages of OTs to compared to TPAs

CONTR–Contractor advantages of OTs compared to TPAs

Interview Question 2b: How do the advantages of OTs impact use of OTs in your organization?

Conceptual Framework Category: OT Advantages versus TPAs

Predetermined Code: OT ADVANTAGES v. TPAs

Predetermined Sub-Code: ADVANTAGES IMPACT ON ORG.

Emergent Sub-Codes:

ORG–Organization impacts on the participant’s organization

COLLAB–Collaborative organization-contractor impacts on the participant’s organization

SPD–Speed and efficiency impacts on the participant’s organization

CONTR–Contractor impacts on the participant’s organization

Interview Question 2c: How do the advantages of OTs impact use of OTs in other DoD organizations?

Conceptual Framework Category: OT Advantages versus TPAs

Predetermined Code: OT ADVANTAGES v. TPAs

Predetermined Sub-Code: ADVANTAGES IMPACT ON DoD

Emergent Sub-Codes:

FLEX–Flexibility impacts of OTs on other DoD organizations

SPD–Speed and efficiency impacts of OTs on other DoD organizations

DOD–DoD-wide impacts of OTs on other DoD organizations

CONTR–Contractor impacts of OTs on other DoD organizations

* Predetermined codes and sub-codes are defined in Appendix X.

<p>Interview Question 3: What do participants believe are the disadvantages of OTs compared to traditional procurement agreements?</p>
<p>Interview Question 3a: What are the disadvantages of using OTs compared to traditional procurement agreements such as contracts, grants, and cooperative agreements? Conceptual Framework Category: OT Disadvantages versus TPAs Predetermined Code: OT DISADVANTAGES v. TPAs* Predetermined Sub-Code: OT DISADVANTAGES*</p> <p>-----</p> <p>Emergent Sub-Codes: EXP–Experience disadvantages of OTs compared to TPAs NEG–OT negotiation and administration disadvantages of OTs compared to TPAs CUL–Organization culture disadvantages of OTs compared to TPAs</p>
<p>Interview Question 3b: How do disadvantages of OTs impact use of OTs in your organization? Conceptual Framework Category: OT Disadvantages versus TPAs Predetermined Code: OT DISADVANTAGES v. TPAs Predetermined Sub-Code: DISADVANTAGES IMPACT ON ORG.</p> <p>-----</p> <p>Emergent Sub-Codes: EXP–Organization experience impacts of OT disadvantages NEG–Organization negotiation and administration impacts of OT disadvantages CUL–Organization culture impacts of OT disadvantages</p>
<p>Interview Question 3c: How do disadvantages of OTs impact use of OTs in other DoD organizations? Conceptual Framework Category: OT Disadvantages versus TPAs Predetermined Code: OT DISADVANTAGES v. TPAs Predetermined Sub-Code: DISADVANTAGES IMPACT ON DOD</p> <p>-----</p> <p>Emergent Sub-Codes: EXP–OT disadvantages impacts on OT experience in other DoD organizations NEG–OT disadvantages impacts on OT negotiation and administration in other DoD organizations CUL–OT disadvantages impacts on culture in other DoD organizations</p>

* Predetermined codes and sub-codes are defined in Appendix X.

<p>Interview Question 4: What do participants believe explains numbers of OTs compared to traditional procurement agreements?*</p>
<p>Interview Question 4a: What factors in your organization help explain the number of OTs executed compared to traditional procurement agreements such as contracts, grants, and cooperative agreements</p> <p>Conceptual Framework Category: Numbers of OTs versus TPAs</p> <p>Predetermined Code: NUMBERS OF OTs v. TPAs*</p> <p>Predetermined Sub-Code: ORG FACTORS*</p> <p>-----</p> <p>Emergent Sub-Codes:</p> <p>EXP–Organization experience factors potentially explaining the numbers of OTs compared to TPAs</p> <p>NEG–OT negotiation/administration factors potentially explaining the numbers of OTs compared to TPAs</p> <p>CUL–Organization culture factors potentially explaining the numbers of OTs compared to TPAs</p>
<p>Interview Question 4b: What DoD-wide factors help explain the numbers of OTs compared to traditional procurement agreements?</p> <p>Conceptual Framework Category: Numbers of OTs versus TPAs</p> <p>Predetermined Code: NUMBERS OF OTs v. TPAs</p> <p>Predetermined Sub-Code: DOD-WIDE FACTORS</p> <p>-----</p> <p>Emergent Sub-Codes:</p> <p>EXP–DoD experience factors potentially explaining numbers of OTs compared to TPAs</p> <p>NEG–OT negotiation/administration potentially explaining numbers of OTs compared to TPAs</p> <p>CUL–DoD culture factors potentially explaining numbers of OTs compared to TPAs</p>

* Predetermined codes and sub-codes are defined in Appendix X.

** As discusses in Chapter 4 and Chapter 5, participant interview data for Interview Questions 4b and 4c are combined. Thus, all data is coded using the Interview Question 4b codes listed in the Table above.

Interview Question 5: What do participants believe are factors that could be changed to impact DoD use of OTs?

Interview Question 5a: What factors in your organization could be changed to impact use of OTs?

Conceptual Framework Category: What can be Changed

Predetermined Code: WHAT CAN BE CHANGED

Predetermined Sub-Code: ORG FACTORS

Emergent Sub-Codes:

EMPL–Employee factors that could be changed to potentially impact organization use of OTs

LDR–Leadership and oversight factors that could be changed to potentially impact organization use of OTs

TRNG–Training and communication factors that could be changed to potentially impact organization use of OTs

Interview Question 5b: What DoD-wide factors could be changed to impact use of OTs?

Conceptual Framework Category: What can be Changed

Predetermined Code: WHAT CAN BE CHANGED

Predetermined Sub-Code: DOD-WIDE FACTORS

Emergent Sub-Codes:

EMPL–Employee factors that could be changed to potentially impact DoD use of OTs

LDR–Leadership and oversight factors that could be changed to potentially impact DoD use of OTs

TRNG–Training and communication factors that could be changed to potentially impact DoD use of OTs

Interview Question 5c: What factors do you believe are resistant to change, but if changed, would impact use of OTs?

Conceptual Framework Category: What can be Changed

Predetermined Code: WHAT CAN BE CHANGED

Predetermined Sub-Code: RESISTANCE TO CHANGE

Emergent Sub-Codes:

EMPL–Employee factors that are resistant to change, but if changed, would potentially impact use of OTs

LDR–Leadership and oversight factors that are resistant to change, but if changed, would potentially impact use of OTs

TRNG–Training and communication factors that are resistant to change, but if changed, would potentially impact use of OTs

Appendix AA. Data Summary Tables: Organization Interviews

Interview Question 1a: How does your organization determine to select an OT instead of a TPA?

Conceptual Framework Category: OT Award

Participant Interview #	Participant Identifier	Emergent Sub-Code: ADMIN*	Emergent Sub-Code: CONTR*	Emergent Sub-Code: DOD*	Emergent-Sub-Code: LEGAL*	Emergent Sub-Code: ORG*
1	DARPA1	x				
2	DARPA2		x	x		
3	AFRL					
4	DARPA3		x			x
5	DARPA4				x	x
6	DIUX					x
7	AFHQ			x	x	
8	OSD		x	x		
9	SPAWAR		x			x
10	PIC				x	x
11	NSC			x	x	x
12	DTRA	x			x	x
13	NAVYHQ					x
14	DOTC					
15	TARDEC	x				x
16	MDA			x	x	x
17	SCO					x
18	PEO-CBD				x	x
19	SOCOM			x		
20	DPAP			x		x
TOTALS		3 of 20 (15%)	4 of 20 (20%)	7 of 20 (35%)	7 of 20 (35%)	13 of 20 (65%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 1b: If you select an OT, what factors can influence negotiations to succeed?

Conceptual Framework Category: OT Award

Participant Interview #	Participant Identifier	Emergent Sub-Code: CONTR*	Emergent Sub-Code: JOINT*	Emergent Sub-Code: LEGAL*	Emergent Sub-Code: ORG*
1	DARPA1		x		
2	DARPA2		x	x	
3	AFRL			x	
4	DARPA3			x	
5	DARPA4				x
6	DIUX	x			x
7	AFHQ				x
8	OSD			x	x
9	SPAWAR	x	x		x
10	PIC		x		
11	NSC				x
12	DTRA		x		
13	NAVYHQ		x		
14	DOTC		x		
15	TARDEC	x	x		
16	MDA				
17	SCO		x		
18	PEO-CBD	x			
19	SOCOM	x			
20	DPAP	x			
TOTALS		6 of 20 (30%)	9 of 20 (45%)	4 of 20 (20%)	6 of 20 (30%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 1c: If you select an OT, what factors can influence negotiations to fail?

Conceptual Framework Category: OT Award

Participant Interview #	Participant Identifier	Emergent Sub-Code: CONTR*	Emergent Sub-Code: JOINT*	Emergent Sub-Code: LEGAL*	Emergent Sub-Code: ORG*
1	DARPA1		x		
2	DARPA2		x		
3	AFRL		x		
4	DARPA3		x	x	
5	DARPA4			x	x
6	DIUX				x
7	AFHQ				
8	OSD				x
9	SPAWAR			x	x
10	PIC				x
11	NSC				x
12	DTRA				
13	NAVYHQ		x		
14	DOTC		x		
15	TARDEC	x			
16	MDA		x		
17	SCO	x	x		
18	PEO-CBD	x			
19	SOCOM	x			
20	DPAP	x			
TOTALS		5 of 20 (25%)	8 of 20 (40%)	3 of 20 (15%)	6 of 20 (30%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 2a: What are the advantages of using OTs compared to TPAs such as contracts, grants, and cooperative agreements?

Conceptual Framework Category: OT Advantages versus TPAs

Participant Interview #	Participant Identifier	Emergent Sub-Code: FLEX*	Emergent Sub-Code: SPD*	Emergent Sub-Code: ORG*	Emergent Sub-Code: CONTR*
1	DARPA1	x		x	x
2	DARPA2	x	x		x
3	AFRL	x			x
4	DARPA3			x	
5	DARPA4	x		x	
6	DIUX	x		x	x
7	AFHQ	x	x		
8	OSD	x		x	
9	SPAWAR	x	x	x	x
10	PIC	x			
11	NSC	x			x
12	DTRA	x	x		
13	NAVYHQ	x		x	
14	DOTC	x		x	x
15	TARDEC	x	x	x	
16	MDA	x			
17	SCO	x	x		
18	PEO-CBD			x	
19	SOCOM	x		x	
20	DPAP	x			
TOTALS		18 of 20 (90%)	6 of 20 (30%)	11 of 20 (55%)	7 of 20 (35%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 2b: How do the advantages of OTs impact use of OTs in your organization?

Conceptual Framework Category: OT Advantages versus TPAs

Participant Interview #	Participant Identifier	Emergent Sub-Code: ORG*	Emergent Sub-Code: COLLAB*	Emergent Sub-Code: SPD*	Emergent Sub-Code: CONTR*
1	DARPA.1	x			x
2	DARPA2	x	x		
3	AFRL	x			
4	DARPA3	x			x
5	DARPA4	x	x		
6	DIUX	x	x	x	
7	AFHQ	x	x		x
8	OSD		x		
9	SPAWAR	x			
10	PIC	x			
11	NSC				
12	DTRA	x		x	
13	NAVYHQ	x		x	
14	DOTC	x	x		x
15	TARDEC	x		x	
16	MDA	x			
17	SCO				
18	PEO-CBD	x			
19	SOCOM				
20	DPAP				
TOTALS		15 of 20 (75%)	6 of 20 (30%)	4 of 20 (20%)	4 of 20 (20%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 2c: How do the advantages of OTs impact use of OTs in other DoD organizations?

Conceptual Framework Category: OT Advantages versus TPAs

Participant Interview #	Participant Identifier	Emergent Sub-Code: FLEX*	Emergent Sub-Code: SPD*	Emergent Sub-Code: DOD*	Emergent Sub-Code: CONTR*
1	DARPA1			x	
2	DARPA2	x		x	x
3	AFRL	x		x	
4	DARPA3				
5	DARPA4	x		x	
6	DIUX	x		x	
7	AFHQ			x	
8	OSD			x	
9	SPAWAR			x	
10	PIC			x	
11	NSC	x		x	x
12	DTRA		x		
13	NAVYHQ				
14	DOTC			x	x
15	TARDEC	x			
16	MDA			x	
17	SCO			x	
18	PEO-CBD	x			
19	SOCOM			x	
20	DPAP	x	x		
TOTALS		8 of 20 (40%)	2 of 20 (10%)	14 of 20 (70%)	3 of 20 (15%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 3a: What are the disadvantages of using OTs compared to TPAs such as contracts, grants, and cooperative agreements?

Conceptual Framework Category: OT disadvantages versus TPAs

Participant Interview #	Participant Identifier	Emergent Sub-Code: EXP*	Emergent Sub-Code: NEG*	Emergent Sub-Code: CUL*
1	DARPA1	x	x	
2	DARPA2	x	x	x
3	AFRL	x		x
4	DARPA3		x	
5	DARPA4		x	x
6	DIUX			
7	AFHQ		x	x
8	OSD	x	x	x
9	SPAWAR	x	x	x
10	PIC	x	x	
11	NSC	x		x
12	DTRA		x	x
13	NAVYHQ			
14	DOTC		x	x
15	TARDEC	x	x	x
16	MDA		x	
17	SCO		x	
18	PEO-CBD			x
19	SOCOM		x	x
20	DPAP		x	
TOTALS		8 of 20 (40%)	15 of 20 (75%)	12 of 20 (60%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 3b: How do disadvantages of OTs impact use of OTs in your organization?

Conceptual Framework Category: OT disadvantages versus TPAs

Participant Interview #	Participant Identifier	Emergent Sub-Code: EXP*	Emergent Sub-Code: NEG*	Emergent Sub-Code: CUL*
1	DARPA1	x	x	
2	DARPA2			
3	AFRL	x		
4	DARPA3			x
5	DARPA4			x
6	DIUX			
7	AFHQ			x
8	OSD			x
9	SPAWAR	x	x	x
10	PIC	x	x	
11	NSC			
12	DTRA			
13	NAVYHQ			x
14	DOTC			
15	TARDEC		x	x
16	MDA		x	
17	SCO			
18	PEO-CBD			x
19	SOCOM			
20	DPAP			
TOTALS		4 of 20 (20%)	5 of 20 (25%)	8 of 20 (40%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 3c: How do disadvantages of OTs impact use of OTs in other DoD organizations?

Conceptual Framework Category: OT disadvantages versus TPAs

Participant Interview #	Participant Identifier	Emergent Sub-Code: EXP*	Emergent Sub-Code: NEG*	Emergent Sub-Code: CUL*
1	DARPA1			x
2	DARPA2	x		x
3	AFRL	x		x
4	DARPA3			x
5	DARPA4		x	x
6	DIUX	x		x
7	AFHQ			x
8	OSD			x
9	SPAWAR			
10	PIC			x
11	NSC	x	x	x
12	DTRA			x
13	NAVYHQ			x
14	DOTC	x		x
15	TARDEC		x	x
16	MDA			
17	SCO		x	
18	PEO-CBD			
19	SOCOM			
20	DPAP		x	
TOTALS		5 of 20 (25%)	5 of 20 (25%)	14 of 20 (70%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 4a: What factors in your organization help explain the number of OTs executed compared to traditional procurement agreements such as contracts, grants, and cooperative agreements?

Conceptual Framework Category: Numbers of OTs versus TPAs

Participant Interview #	Participant Identifier	Emergent Sub-Code: EXP*	Emergent Sub-Code: NEG*	Emergent Sub-Code: CUL*
1	DARPA1		x	
2	DARPA2			
3	AFRL		x	
4	DARPA3		x	x
5	DARPA4		x	
6	DIUX	x	x	x
7	AFHQ	x	x	
8	OSD	x		
9	SPAWAR		x	x
10	PIC	x		
11	NSC			
12	DTRA		x	x
13	NAVYHQ			
14	DOTC		x	x
15	TARDEC		x	x
16	MDA	x		x
17	SCO	x	x	x
18	PEO-CBD		x	x
19	SOCOM	x	x	x
20	DPAP			
TOTALS		7 of 20 (35%)	13 of 20 (65%)	10 of 20 (50%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 4b: What DoD-wide factors help explain the numbers of OTs compared to traditional procurement agreements?

Conceptual Framework Category: Numbers of OTs versus TPAs

Participant Interview #	Participant Identifier	Emergent Sub-Code: EXP*	Emergent Sub-Code: NEG*	Emergent Sub-Code: CUL*
1	DARPA1		x	x
2	DARPA2		x	x
3	AFRL			x
4	DARPA3			x
5	DARPA4		x	x
6	DIUX		x	x
7	AFHQ		x	
8	OSD	x	x	x
9	SPAWAR			x
10	PIC			x
11	NSC			x
12	DTRA	x	x	x
13	NAVYHQ			x
14	DOTC		x	x
15	TARDEC		x	x
16	MDA		x	x
17	SCO		x	x
18	PEO-CBD		x	x
19	SOCOM		x	x
20	DPAP	x		x
TOTALS		3 of 20 (15%)	13 of 20 (65%)	19 of 20 (95%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 5a: What factors in your organization could be changed to impact use of OTs?

Conceptual Framework Category: What can be Changed

Participant Interview #	Participant Identifier	Emergent Sub-Code: EMPLY*	Emergent Sub-Code: LDR*	Emergent Sub-Code: TRNG*
1	DARPA1			
2	DARPA2			
3	AFRL			x
4	DARPA3	x	x	
5	DARPA4		x	
6	DIUX			
7	AFHQ	x	x	x
8	OSD			
9	SPAWAR		x	x
10	PIC		x	x
11	NSC			
12	DTRA		x	
13	NAVYHQ			
14	DOTC		x	x
15	TARDEC		x	x
16	MDA	x	x	x
17	SCO		x	x
18	PEO-CBD			x
19	SOCOM		x	x
20	DPAP			
TOTALS		3 of 20 (15%)	11 of 20 (55%)	10 of 20 (50%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 5b: What DoD-wide factors could be changed to impact use of OTs?

Conceptual Framework Category: What can be Changed

Participant Interview #	Participant Identifier	Emergent Sub-Code: EMPLY*	Emergent Sub-Code: LDR*	Emergent Sub-Code: TRNG*
1	DARPA1		x	x
2	DARPA2	x	x	
3	AFRL		x	
4	DARPA3	x	x	
5	DARPA4	x	x	x
6	DIUX		x	
7	AFHQ		x	
8	OSD	x	x	x
9	SPAWAR		x	x
10	PIC		x	x
11	NSC			x
12	DTRA		x	x
13	NAVYHQ	x	x	x
14	DOTC		x	x
15	TARDEC		x	
16	MDA		x	x
17	SCO		x	x
18	PEO-CBD		x	x
19	SOCOM		x	x
20	DPAP		x	
TOTALS		5 of 20 (25%)	19 of 20 (95%)	13 of 20 (65%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 5c: What factors do you believe are resistant to change, but if changed, would impact use of OTs?

Conceptual Framework Category: What can be Changed

Participant Interview #	Participant Identifier	Emergent Sub-Code: EMPLY*	Emergent Sub-Code: LDR*	Emergent Sub-Code: TRNG*
1	DARPA1			
2	DARPA2	x	x	
3	AFRL			x
4	DARPA3		x	
5	DARPA4	x	x	
6	DIUX			
7	AFHQ	x	x	
8	OSD			
9	SPAWAR	x	x	x
10	PIC		x	
11	NSC		x	
12	DTRA		x	x
13	NAVYHQ		x	
14	DOTC	x	x	
15	TARDEC	x		x
16	MDA		x	
17	SCO	x	x	x
18	PEO-CBD	x	x	
19	SOCOM		x	
20	DPAP	x	x	x
TOTALS		9 of 20 (45%)	15 of 20 (75%)	6 of 20 (30%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Appendix BB. Findings Roadmap: Organization Interviews

(Note: Significant findings are bulleted)

Major Findings 1

Organizations select OTs instead of traditional procurement agreements because OTs help them field new advanced technology capabilities and to do business with non-traditional contractors. The success of OT negotiations is influenced by joint factors such as the parties' prior experience with OTs, mutual trust and open communication, being flexible, and understanding the other party's legal and business needs.

- Organizations select OTs instead of traditional procurement agreements because OTs help them field new advanced technology capabilities and enable them to do business with non-traditional contractors. OTs are an emerging area of procurement at some organizations (13 of 20 participants [65%]).
- Joint factors, including the amount of prior experience that parties have with OTs, mutual trust and open communications, being flexible, and understanding the other party's legal limitations or business needs can potentially influence OT negotiations to succeed (9 of 20 participants [45%]).
- Joint factors, including lack of trust between the parties, poor communications, and the parties being inflexible with each other can potentially cause OT negotiations to fail (8 of 20 participants [40%]).

Major Findings 2

OTs offer more flexible terms and conditions than TPAs and improve communication and collaboration between the parties. OTs are enabling organizations to achieve new technology solutions for mission needs. The word is spreading across DoD organizations about the benefits of OTs. This has recently resulted in more DoD organizations using OTs. Cultural factors such as risk-aversion and entrenched bureaucracy, however, continue to oppose more significant impact of OTs in some DoD organizations.

- OTs offer flexibility advantages over TPAs, including the ability to tailor the OT terms and conditions, funding advantages such as cost-sharing and advance payments, reduction in administrative workload and process time, improved collaboration and communication between the parties, and enhanced access to contractors that would not do business with the government (18 of 20 participants [90%]).
- Increasing dollars are being spent on OTs by DoD organizations. OTs are enabling organizations to achieve new technology solutions for mission needs. Organizational learning about OTs has resulted in more successful OTs, which has increased the use of OTs by some DoD organizations (15 of 20 participants [75%]).

- The word is spreading across DoD organizations about the benefits of OTs. This has recently resulted in more DoD organizations using OTs. Cultural factors such as risk-aversion and entrenched bureaucracy, however, continue to oppose more significant impact of OTs in other DoD organizations [14 of 20 participants [70%]].

Major Findings 3

There is resistance to change (OTs) by contracting officers, program managers, and organization leadership. Procurement professionals and program managers fear losing control of procurement processes and giving up their turf. Some DoD organizations have rigid leadership that punishes procurement failures and mistakes. The audit-prone and risk-intolerant culture of DoD discourages DoD personnel from trying OTs. The stigma OTs got from the Army's failed FCS program continues to impact the use of OTs by DoD organizations.

- OTs are not routine: they take longer to negotiate than traditional procurement agreements, particularly with nontraditional contractors. For OT negotiations to succeed, the government and contractor must dedicate experienced personnel. The flexibility of OTs can lead to failure to include important terms and conditions and increase the probability of repeating mistakes from the past that are addressed by procurement regulations. The cost-share and nontraditional contractor participation requirements of the OT statute may dis-incentivize some traditional contractors from participating in OT opportunities (15 of 20 participants [75%]).
- DoD organizations are unfamiliar with how to use OTs. Organization personnel fear the unknown and are hesitant to try a new type of procurement processes such as OTs. They resist OTs using because they are fearful of making mistakes and negative audits by the DoD IG. DoD organizations that have programs to deliver goods and services resist using OTs because OTs are believed to be suitable only for R&D projects. Some DoD organizations view OTs as a last resort and only use OTs when it is impossible to do a traditional procurement agreement (8 of 20 participants [40%]).
- There is resistance to change (OTs) by contracting officers, program managers, and organization leadership. Procurement professionals and program managers fear losing control of procurement processes and giving up their turf. Some DoD organizations have rigid leadership that punishes procurement failures and mistakes. The audit-prone and risk-intolerant culture of DoD discourage DoD personnel from trying OTs. The stigma OTs got from the Army's failed FCS program continues to impact the use of OTs by DoD organizations (14 of 20 participants [65%]).

Major Findings 4

Traditional procurement agreements are appropriate for most DoD requirements. OT advantages such as speed to award impact the numbers of OTs. OT disadvantages such as negotiation workload impact the numbers of OTs. DoD personnel are unfamiliar with OTs. They are risk-averse to try new procurement tools such as OTs. DoD personnel are used to relying on

traditional procurement policies and regulations. There is a lack of training and policy guidance about OTs. There is relatively little DoD leadership support for OTs.

- Traditional procurement agreements are appropriate for most DoD requirements. The needs of organization customers and attracting nontraditional contractors impact whether to use an OT. OT advantages such as speed to award impact whether to use an OT. OT disadvantages such as negotiation workload impact whether to use an OT. Individual OTs awarded under consortium OTs account for most DoD OTs, yet these awards are not recorded in FPDS (13 of 20 participants [65%]).
- DoD personnel are unfamiliar with OTs. They are risk-averse to try new procurement tools such as OTs. DoD personnel are used to relying on traditional procurement policies and regulations. They fear repeating procurement mistakes from the past. There is a lack of training and guidance about OTs. OTs are harder to negotiate and have a higher risk of failure than traditional procurement agreements. There is relatively little DoD leadership support for OTs (19 of 20 participants [95%]).

Major Findings 5

Institutional inertia, employee habit, and risk aversion cause DoD organizations and personnel to continue to rely on TPAs instead of OTs. Leadership must become actively involved in publicly supporting OTs and in encouraging DoD organizations to use OTs. Additional guidance, OT templates, sample clauses, and knowledge management tools must be provided to help DoD organizations and personnel more effectively use OTs. DoD organizations and personnel should be given additional authority, and independence to use OTs and not suffer adverse career consequences just because an OT fails.

- For OTs to succeed, organization personnel must adopt new ways of thinking. Leadership should communicate the benefits of OTs to organization personnel to persuade them to try OTs. Additional guidance, sample clauses, and higher dollar levels of delegated OT authority will positively impact use of OTs by DoD organizations. Putting more trust in the judgment of agreements officers will positively impact the use of OTs by DoD organization. Active leadership support for OTs will positively impact use of OTs by DoD organizations (11 of 20 participants [55%]).
- Leadership should trust the judgment of agreements officers on OTs. DoD personnel should not suffer adverse career consequences just because an OT failed. Leadership should actively and publicly support OTs. OT templates, sample clauses, an online knowledge management tools should be provided to help DoD organizations more effectively use OTs. Fiscal policy should be changed to broaden the types of appropriated funds that can be used for OTs. A method for quantifying the benefits of OTs should be developed. The one-third cost share requirement for traditional contractors should be eliminated because it deters traditional contractors using from using OTs (19 of 20 participants [95%]).
- Institutional inertia causes DoD personnel and organizations to continue to use TPAs instead of OTs. Leadership must be actively involved in breaking institutional resistance to change

that arises from habitual reliance on TPAs and employee risk aversion to trying new procurement tools such as OTs. Leadership should carry out procurement policies and offer training and knowledge management that encourage and support the use of OTs (15 of 20 participants [75%]).

Appendix CC. Data Summary Tables: Living Foundries and RSGS OT Case Studies

Interview Question 1a: How does your organization determine to select an OT instead of a TPA?

Conceptual Framework Category: OT Award

Participant Interview #	Participant Identifier	Emergent Sub-Code: ADMIN*	Emergent Sub-Code: CONTR*	Emergent Sub-Code: DOD*	Emergent-Sub-Code: LEGAL*	Emergent Sub-Code: ORG*
1	LF1		x		x	
2	LF2	x			x	x
3	LF3	x			x	
4	LF4	x				
5	LF5	x				
TOTALS		4 of 5 (80%)	1 of 5 (20%)	0 of 5 (0%)	3 of 5 (60%)	1 of 5 (20%)

Source: Table format adapted from Bloomberg (2012).

Participant Interview #	Participant Identifier	Emergent Sub-Code: ADMIN*	Emergent Sub-Code: CONTR*	Emergent Sub-Code: DOD*	Emergent-Sub-Code: LEGAL*	Emergent Sub-Code: ORG*
1	RSGS1	x	x			
2	RSGS2	x			x	
3	RSGS3					x
4	RSGS4					x
5	RSGS5	x	x			
TOTALS		3 of 5 (60%)	2 of 5 (40%)	0 of 5 (0%)	1 of 5 (20%)	2 of 5 (40%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 1b: If you select an OT, what factors can influence negotiations to succeed?

Conceptual Framework Category: OT Award

Participant Interview #	Participant Identifier	Emergent Sub-Code: CONTR*	Emergent Sub-Code: JOINT*	Emergent-Sub-Code: LEGAL*	Emergent Sub-Code: ORG*
1	LF1	x	x		
2	LF2				x
3	LF3				x
4	LF4	x	x	x	
5	LF5	x			
TOTALS		3 of 5 (60%)	2 of 5 (40%)	1 of 5 (20%)	2 of 5 (40%)

Source: Table format adapted from Bloomberg (2012).

Participant Interview #	Participant Identifier	Emergent Sub-Code: CONTR*	Emergent Sub-Code: JOINT*	Emergent-Sub-Code: LEGAL*	Emergent Sub-Code: ORG*
1	RSGS1		x	x	
2	RSGS2		x	x	
3	RSGS3		x		
4	RSGS4		x		
5	RSGS5	x	x		
TOTALS		1 of 5 (20%)	5 of 5 (100%)	2 of 5 (40%)	0 of 5 (0%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 1c: If you select an OT, what factors can influence negotiations to fail?

Conceptual Framework Category: OT Award

Participant Interview #	Participant Identifier	Emergent Sub-Code: CONTR*	Emergent Sub-Code: JOINT*	Emergent-Sub-Code: LEGAL*	Emergent Sub-Code: ORG*
1	LF1	x			
2	LF2		x	x	
3	LF3		x		
4	LF4			x	
5	LF5	x			
TOTALS		2 of 5 (40%)	2 of 5 (40%)	2 of 5 (40%)	0 of 5 (0%)

Source: Table format adapted from Bloomberg (2012).

Participant Interview #	Participant Identifier	Emergent Sub-Code: CONTR*	Emergent Sub-Code: JOINT*	Emergent-Sub-Code: LEGAL*	Emergent Sub-Code: ORG*
1	RSGS1			x	
2	RSGS2	x			
3	RSGS3		x		
4	RSGS4		x		x
5	RSGS5				x
TOTALS		1 of 5 (20%)	2 of 5 (40%)	1 of 5 (20%)	2 of 5 (40%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 2a: What are the advantages of using OTs compared to traditional procurement agreements such as contracts, grants, and cooperative agreements?

Conceptual Framework Category: OT Advantages versus Traditional Procurement Agreements (TPAs)

Participant Interview #	Participant Identifier	Emergent Sub-Code: FLEX*	Emergent Sub-Code: SPD*	Emergent Sub-Code: ORG*	Emergent-Sub-Code: CONTR*
1	LF1			x	
2	LF2	x	x	x	
3	LF3	x	x		
4	LF4	x		x	x
5	LF5	x			
TOTALS		4 of 5 (80%)	2 of 5 (40%)	3 of 5 (60%)	1 of 5 (20%)

Source: Table format adapted from Bloomberg (2012).

Participant Interview #	Participant Identifier	Emergent Sub-Code: FLEX*	Emergent Sub-Code: SPD*	Emergent Sub-Code: ORG*	Emergent-Sub-Code: CONTR*
1	RSGS1	x		x	x
2	RSGS2	x			
3	RSGS3	x	x	x	
4	RSGS4	x			
5	RSGS5	x			
TOTALS		5 of 5 (100%)	1 of 5 (20%)	2 of 5 (40%)	1 of 5 (20%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 2b: How do the advantages of OTs impact use of OTs in your organization?

Conceptual Framework Category: OT Advantages versus TPAs

Participant Interview #	Participant Identifier	Emergent Sub-Code: ORG*	Emergent Sub-Code: COLLAB*	Emergent-Sub-Code: SPD*	Emergent Sub-Code: CONTR*
1	LF1	x	x		
2	LF2	x		x	
3	LF3	x			
4	LF4		x		x
5	LF5		x		x
TOTALS		3 of 5 (60%)	3 of 5 (60%)	1 of 5 (20%)	2 of 5 (40%)

Source: Table format adapted from Bloomberg (2012).

Participant Interview #	Participant Identifier	Emergent Sub-Code: ORG*	Emergent Sub-Code: COLLAB*	Emergent-Sub-Code: SPD*	Emergent Sub-Code: CONTR*
1	RSGS1	x	x		
2	RSGS2	x			x
3	RSGS3	x			
4	RSGS4	x			
5	RSGS5				x
TOTALS		4 of 5 (80%)	1 of 5 (20%)	0 of 5 (0%)	2 of 5 (40%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 2c: How do the advantages of OTs impact use of OTs in other DoD organizations?

Conceptual Framework Category: OT Advantages versus TPAs

Participant Interview #	Participant Identifier	Emergent Sub-Code: FLEX*	Emergent Sub-Code: SPD*	Emergent-Sub-Code: DOD*	Emergent Sub-Code: CONTR*
1	LF1			x	
2	LF2			x	
3	LF3		x		
4	LF4				
5	LF5				
TOTALS		0 of 5 (0%)	1 of 5 (20%)	2 of 5 (40%)	0 of 5 (0%)

Source: Table format adapted from Bloomberg (2012).

Participant Interview #	Participant Identifier	Emergent Sub-Code: FLEX*	Emergent Sub-Code: SPD*	Emergent-Sub-Code: DOD*	Emergent Sub-Code: CONTR*
1	RSGS1		x	x	
2	RSGS2			x	x
3	RSGS3			x	
4	RSGS4			x	
5	RSGS5	x		x	
TOTALS		1 of 5 (20%)	1 of 5 (20%)	5 of 5 (100%)	1 of 5 (20%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 3a: What are the disadvantages of using OTs compared to TPAs such as contracts, grants, and cooperative agreements?

Conceptual Framework Category: OT disadvantages versus TPAs

Participant Interview #	Participant Identifier	Emergent Sub-Code: EXP*	Emergent Sub-Code: NEG*	Emergent Sub-Code: CUL*
1	LF1		x	
2	LF2		x	
3	LF3		x	
4	LF4		x	
5	LF5	x	x	
TOTALS		1 of 5 (20%)	5 of 5 (100%)	0 of 5 (0%)

Source: Table format adapted from Bloomberg (2012).

Participant Interview #	Participant Identifier	Emergent Sub-Code: EXP*	Emergent Sub-Code: NEG*	Emergent Sub-Code: CUL*
1	RSGS1	x	x	
2	RSGS2			x
3	RSGS3		x	x
4	RSGS4		x	
5	RSGS5		x	
TOTALS		1 of 5 (20%)	4 of 5 (80%)	2 of 5 (40%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 3b: How do disadvantages of OTs impact use of OTs in your organization?

Conceptual Framework Category: OT disadvantages versus TPAs

Participant Interview #	Participant Identifier	Emergent Sub-Code: EXP*	Emergent Sub-Code: NEG*	Emergent Sub-Code: CUL*
1	LF1			x
2	LF2		x	
3	LF3			
4	LF4		x	
5	LF5		x	x
TOTALS		0 of 5 (0%)	3 of 5 (60%)	2 of 5 (40%)

Source: Table format adapted from Bloomberg (2012).

Participant Interview #	Participant Identifier	Emergent Sub-Code: EXP*	Emergent Sub-Code: NEG*	Emergent Sub-Code: CUL*
1	RSGS1		x	
2	RSGS2		x	
3	RSGS3			x
4	RSGS4	x		
5	RSGS5		x	
TOTALS		1 of 5 (20%)	3 of 5 (60%)	1 of 5 (20%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 3c: How do disadvantages of OTs impact use of OTs in other DoD organizations?

Conceptual Framework Category: OT disadvantages versus TPAs

Participant Interview #	Participant Identifier	Emergent Sub-Code: EXP*	Emergent Sub-Code: NEG*	Emergent Sub-Code: CUL*
1	LF1	x		
2	LF2		x	x
3	LF3			x
4	LF4			
5	LF5			
TOTALS		1 of 5 (20%)	1 of 5 (20%)	2 of 5 (40%)

Source: Table format adapted from Bloomberg (2012).

Participant Interview #	Participant Identifier	Emergent Sub-Code: EXP*	Emergent Sub-Code: NEG*	Emergent Sub-Code: CUL*
1	RSGS1			x
2	RSGS2	x		x
3	RSGS3			x
4	RSGS4	x		x
5	RSGS5	x	x	x
TOTALS		3 of 5 (60%)	1 of 5 (20%)	5 of 5 (100%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 4a: What factors in your organization help explain the number of OTs executed compared to traditional procurement agreements such as contracts, grants, and cooperative agreements?

Conceptual Framework Category: Numbers of OTs versus TPAs

Participant Interview #	Participant Identifier	Emergent Sub-Code: EXP*	Emergent Sub-Code: NEG*	Emergent Sub-Code: CUL*
1	LF1		x	x
2	LF2	x	x	x
3	LF3	x	x	x
4	LF4			x
5	LF5			x
TOTALS		2 of 5 (40%)	3 of 5 (60%)	5 of 5 (100%)

Source: Table format adapted from Bloomberg (2012).

Participant Interview #	Participant Identifier	Emergent Sub-Code: EXP*	Emergent Sub-Code: NEG*	Emergent Sub-Code: CUL*
1	RSGS1			x
2	RSGS2	x	x	x
3	RSGS3		x	x
4	RSGS4			x
5	RSGS5			x
TOTALS		1 of 5 (20%)	2 of 5 (40%)	5 of 5 (100%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 4b: What DoD-wide factors help explain the numbers of OTs compared to traditional procurement agreements?

Conceptual Framework Category: Numbers of OTs versus TPAs

Participant Interview #	Participant Identifier	Emergent Sub-Code: EXP*	Emergent Sub-Code: NEG*	Emergent Sub-Code: CUL*
1	LF1			x
2	LF2			x
3	LF3			x
4	LF4			
5	LF5			
TOTALS		0 of 5 (0%)	0 of 5 (0%)	3 of 5 (60%)

Source: Table format adapted from Bloomberg (2012).

Participant Interview #	Participant Identifier	Emergent Sub-Code: EXP*	Emergent Sub-Code: NEG*	Emergent Sub-Code: CUL*
1	RSGS1		x	
2	RSGS2			x
3	RSGS3			x
4	RSGS4			
5	RSGS5			x
TOTALS		0 of 5 (0%)	1 of 5 (20%)	3 of 5 (60%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 5a: What factors in your organization could be changed to impact use of OTs?

Conceptual Framework Category: What can be Changed

Participant Interview #	Participant Identifier	Emergent Sub-Code: EMPLY*	Emergent Sub-Code: LDR*	Emergent Sub-Code: TRNG*
1	LF1	x		x
2	LF2		x	
3	LF3			x
4	LF4		x	
5	LF5		x	
TOTALS		1 of 5 (20%)	3 of 5 (60%)	2 of 5 (40%)

Source: Table format adapted from Bloomberg (2012).

Participant Interview #	Participant Identifier	Emergent Sub-Code: EMPLY*	Emergent Sub-Code: LDR*	Emergent Sub-Code: TRNG*
1	RSGS1		x	
2	RSGS2			
3	RSGS3	x		x
4	RSGS4		x	x
5	RSGS5		x	x
TOTALS		1 of 5 (20%)	3 of 5 (60%)	3 of 5 (60%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 5b: What DoD-wide factors could be changed to impact use of OTs?

Conceptual Framework Category: What can be Changed

Participant Interview #	Participant Identifier	Emergent Sub-Code: EMPLY*	Emergent Sub-Code: LDR*	Emergent Sub-Code: TRNG*
1	LF1	x		
2	LF2		x	x
3	LF3			x
4	LF4		x	
5	LF5			x
TOTALS		1 of 5 (20%)	2 of 5 (40%)	3 of 5 (60%)

Source: Table format adapted from Bloomberg (2012).

Participant Interview #	Participant Identifier	Emergent Sub-Code: EMPLY*	Emergent Sub-Code: LDR*	Emergent Sub-Code: TRNG*
1	RSGS1	x		x
2	RSGS2		x	
3	RSGS3	x		
4	RSGS4		x	x
5	RSGS5		x	
TOTALS		2 of 5 (40%)	3 of 5 (60%)	2 of 5 (40%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Interview Question 5c: What factors do you believe are resistant to change, but if changed, would impact the use of OTs?

Conceptual Framework Category: What can be Changed

Participant Interview #	Participant Identifier	Emergent Sub-Code: EMPLY*	Emergent Sub-Code: LDR*	Emergent Sub-Code: TRNG*
1	LF1			x
2	LF2	x	x	
3	LF3			x
4	LF4			
5	LF5	x		
TOTALS		2 of 5 (40%)	1 of 5 (20%)	2 of 5 (40%)

Source: Table format adapted from Bloomberg (2012).

Participant Interview #	Participant Identifier	Emergent Sub-Code: EMPLY*	Emergent Sub-Code: LDR*	Emergent Sub-Code: TRNG*
1	RSGS1	x		x
2	RSGS2	x	x	
3	RSGS3	x		
4	RSGS4	x		
5	RSGS5	x		x
TOTALS		5 of 5 (100%)	1 of 5 (20%)	2 of 5 (40%)

Source: Table format adapted from Bloomberg (2012).

* Emergent sub-codes are defined in Appendix Z.

Appendix DD. Findings Roadmap: RSGS OT Case Study

(Note: Significant findings are bulleted)

Major Findings 1

OTs offer flexibility to draft OT terms and conditions to meet the needs of the parties. OTs offer the government the ability to accept funding from the OT contractor. OTs offer contractors flexibility to use commercial instead of FAR terms. The parties must give and take and reach consensus on important terms and conditions for OT negotiations to succeed. Mistrust between the parties can be a source of OT negotiation failure. Both sides must have people educated about OTs.

- OTs offer flexibility to draft OT terms and conditions to meet the needs of the parties. OTs offer the government the ability to accept funding from the OT contractor. OTs offer contractors the flexibility to use commercial instead of FAR terms. These factors impact the decision to select an OT instead of a traditional procurement agreement (3 of 5 participants [60%]).
- In-person negotiations between the parties is a positive factor impacting successful OT negotiations. The parties must give and take and reach consensus on essential terms and conditions for OT negotiations to succeed. Open communications and transparency between the parties are positive factors impacting successful OT negotiations (5 of 5 participants [100%]).
- Mistrust between the parties can be a source of OT negotiation failure. Both sides must use people educated about OTs. Contracting officer workload on other procurements can be a source of OT negotiation failure. The DoD organization's OT template can be a source of OT negotiation failure if it differs from what the contractor expected and the DoD organization will negotiate, for instance, for intellectual property rights (2 of 5 participants [40%]).

Major Findings 2

OTs are more flexible than traditional procurement agreements because changing an OT is easier, and because the government can accept funding and in-kind contributions from the OT contractor. Fewer rules and regulations apply to OT compared to traditional procurement agreements. OTs enable organizations to do business with nontraditional contractors hesitant to work with the government.

- OTs are more flexible than traditional procurement agreements because changing the OT is easier and because the government can accept funding and in-kind contributions from the OT contractor. There are fewer rules and regulations that apply to OT compared to traditional procurement agreements. OTs enable the parties to use commercial terms and conditions, which helps contractors unfamiliar with federal procurement regulations (5 of 5 participants [100%]).

- OTs enable organizations to change standard terms and conditions to meet the contractor's business needs. Organizations experienced with OTs build up a comfort level with them that encourages their wider use. OTs enable organizations to do business with nontraditional contractors hesitant to work with the government (4 of 5 participants [80%]).
- OTs are suitable to DoD organizations for attracting commercial contractors to do business with DoD organizations. The success of the RSGS program will help spread the word to other DoD organizations about the benefits of OTs. DoD organizations need to be educated about OTs to use them more widely (5 of 5 participants [100%]).

Major Findings 3

During OT negotiations, it can be uncertain what terms and conditions are mandatory to include in the agreement and what can be negotiated. There is a lack of OT expertise at some DoD organizations and this can protract OT negotiations. Lack of OT expertise can also discourage program managers from being willing to use OTs. DoD organizations are culturally biased to continue to use what they are comfortable with, traditional procurement agreements. Fear of the unknown discourages organizations from using OTs. They will resist if you force them to do something they are not comfortable with such as use OTs.

- During OT negotiations, it is uncertain to the parties what terms and conditions are mandatory to include in the agreement and what terms and conditions can be negotiated. There are no specific guidelines on terms and conditions required in an OT, and this can cause negotiations being protracted because the parties have to discuss all terms and conditions (4 of 5 participants [80%]).
- There is a lack of OT expertise at some DoD organizations and this can cause OT negotiations to be protracted. This can also discourage program managers from being willing to use OTs. It can be challenging to negotiate the government and contractor cost shares in an OT (3 of 5 participants [60%]).
- DoD organizations are culturally biased to continue to use what they are comfortable with traditional procurement agreements. Fear of the unknown discourages organizations from using OTs. They will resist if you force them to do something they are not comfortable with such as OTs. OTs make sense when there is a dual-use commercial marketplace benefit for the OT contractor. Weapons system procurements rarely offer dual-use commercial marketplace benefits to contractors (5 of 5 participants [100%]).

Major Findings 4

Organizations with R&D missions may have higher numbers of OTs. Organizations with expertise in OTs may have higher numbers of OTs. Organizations that want more control over agreements may have higher numbers of traditional procurement agreements. The personnel resources, time, and creativity needed to negotiate and administer OTs may lead to higher numbers of traditional procurement agreements.

- Organizations with R&D missions may have higher numbers of OTs. Organizations with expertise in OTs may have higher numbers of OTs. Organizations that want more control over agreements may have higher numbers of traditional procurement agreements. The personnel resources, time, and creativity needed to negotiate and administer OTs may lead to higher numbers of traditional procurement agreements. For contractors, their numbers of OTs are associated with the business case supporting each OT (5 of 5 participants [100%]).
- The lack of familiarity with OTs is a DoD-wide factor that explains the low numbers of OTs. There is also a lack of out-of-the-box thinking at DoD organizations that may contribute to the low numbers of OTs (3 of 5 participants [60%]).

Major Findings 5

Greater emphasis on in-person, creative OT negotiations may impact organization use of OTs. Leadership-supported outreach to nontraditional contractors may impact organization use of OTs. Use of industry-specific OT templates may speed up OT negotiations, which may impact organization use of OTs. DoD should consider the benefits to the commercial partner when negotiating OTs. DoD employees such as contracting officers are comfortable with procurement processes they understand, such as the FAR, and are uncomfortable to try new processes such as OTs. DoD employees will continue to be averse to using new procurement processes such as OTs unless they have employees around them that will help them become familiar with OTs.

- Greater emphasis on in-person, creative OT negotiations may impact organization use of OTs. Leadership-supported outreach to nontraditional contractors may impact organization use of OTs. Use of industry-specific OT templates may speed up OT negotiations, which may impact organization use of OTs. Interactive OT training for senior organization employees may impact organization use of OTs (3 of 5 participants [60%]).
- DoD should consider the benefits to the commercial partner when negotiating OTs. DoD should be careful to use OTs lest Congress take away OT authority. DoD should guide contractors on what types of non-monetary contributions that contractors can give to satisfy the cost-share requirements of OTs (3 of 5 participants [60%]).
- DoD employees such as contracting officers are comfortable with procurement processes they understand, such as the FAR, and are uncomfortable to try new processes such as OTs. DoD employees will continue to be averse to using new procurement processes such as OTs unless they have employees around them that will help them become familiar with OTs. DoD employees do not understand where the line is between what can and cannot be negotiated in OTs (5 of 5 participants [100%]).

Appendix EE. Findings Roadmap: Living Foundries OT Case Study

(Note: Significant findings are bulleted)

Major Findings 1

OTs enable the government to work more effectively with nontraditional contractors. OTs enable enhanced communications and information-sharing during OT negotiations. The amount of prior experience that a contractor has with OTs can impact whether OT negotiations succeed.

- OTs enable the government to work with nontraditional contractors. OTs offer more negotiation flexibility and less administrative burden than traditional procurement agreements, and these are important factors for small, nontraditional contractors (3 of 5 participants [60%]).
- Contractors must give the government information it requests to help successful OT negotiations. The government must tell the contractor what OT terms and conditions are non-negotiable because of statutory or regulatory requirements. Skill at negotiating flexible payable technical milestones impacts whether OT negotiations are successful (3 of 5 participants [60%]).
- Negotiating specific terms and conditions such as cost-share, property disposition, and intellectual property liability can contribute to OT negotiations failure. Whether the OT contractor has prior experience with OTs might add to OT negotiations failure. Negotiation of payment for OT technical milestones can be a potential source of OT negotiations failure (2 of 5 participants [40%]).

Major Findings 2

OTs offer simpler and more flexible terms and conditions than traditional procurement agreements. OTs impact the ability of organizations to attract and work with advanced technology contractors. OTs enhance the ability of organizations to achieve technical program goals. DCMA, the DoD organization that administers awarded contracts, and increasingly, awarded OTs, is unfamiliar with OTs, and this may impede the more extensive use of OTs across DoD.

- OTs offer simpler and more flexible terms and conditions than traditional procurement agreements. OTs are less bureaucratic than traditional procurement agreements. The lack of bureaucracy enhances the ability of the parties to OT draft terms and conditions to describe novel technologies (4 of 5 participants [80%]).
- OTs positively impact the ability of organizations to attract and work with advanced technology contractors. OTs enhance the ability of organizations to achieve technical program goals (3 of 5 participants [60%]).

- Recent senior DoD leadership focus on OTs has had positive impacts on awareness and use of OTs across DoD. DCMA, the DoD organization that administers awarded contracts, and increasingly, awarded OTs, is unfamiliar with OTs, and this may impede the more extensive use of OTs across DoD (2 of 5 participants [40%]).

Major Findings 3

OTs can take longer to negotiate than traditional procurement agreements because most terms and conditions are negotiable. OTs are flexible and thus can be changed during performing the OT, which is time-consuming for the parties. OT training should be required as part of a contracting officer's warrant. Only trained contracting officers should be allowed to negotiate and administer OTs.

- OTs can take longer to negotiate than traditional procurement agreements because most terms and conditions are negotiable. OTs are flexible and thus can be repetitively changed during performance of the OT, which is time-consuming for the parties. Technical milestones may be challenging for the contractor to achieve, resulting in lower or delayed milestone payments from the government. OT contractors believe it difficult for the government to add funds to an ongoing OT to pay for new work or for defraying unanticipated work costs (5 of 5 participants [100%]).
- DoD organizations such as DARPA are trying to reduce the time to negotiate and award OTs. OT contractors believe OTs take the same time to negotiate as commercial contracts. OT contractors would like for the government pays the costs for unanticipated or unplanned work during OT administration (3 of 5 participants [60%]).
- OT training should be required as part of a contracting officer's warrant. Only trained contracting officers should be allowed to negotiate and administer OTs. DoD needs cultural change to access and leverage advanced technologies from nontraditional contractors (2 of 5 participants [40%]).

Major Findings 4

The nature of the DoD organization's mission impacts the numbers of OTs executed compared to traditional procurement agreements. DoD organizations are used to relying on procurement regulations to help them negotiate and administer traditional procurement agreements. DoD organizations lack confidence in their contracting officers to negotiate OTs because contracting officers have insufficient training and experience with OTs. Contracting officer workload can impact whether an OT or traditional procurement agreement is selected for a prospective procurement.

- The nature of the DoD organization's mission impacts the numbers of OTs executed compared to traditional procurement agreements. Heavy contracting officer workload can influence whether an OT or traditional procurement agreement is selected for a project. Projects involving universities may favor using a grant instead of an OT. For nontraditional

contractors, the company's business objectives impact whether it prefers using an OT or a traditional procurement agreement (5 of 5 participants [100%]).

- DoD organizations lack confidence in their contracting officers to negotiate OTs because contracting officers have insufficient training and experience with OTs. DoD organizations are used to relying on procurement regulations to help them negotiate and administer traditional procurement agreements. The heavy workload on contracting officers results in more traditional procurement agreements being awarded than OTs (3 of 5 participants [60%]).

Major Findings 5

Adopting OT best practices from other federal agencies such as DHS might positively impact DoD use of OTs. Publicizing OT success stories by organizations other than DARPA and DIUx may positively impact DoD use of OTs. Providing nontraditional contractors with basic OT training information, for instance, information comparing OTs to traditional procurement agreements may positively impact DoD use of OTs. Providing more resources to DoD contracting agents might help them be more willing to use OTs.

- Adopting OT best practices from other federal agencies such as DHS might positively impact DoD organization use of OTs. If DoD was more flexible on reimbursing OT contractors' costs, it might positively impact contractors' willingness to use OTs. (3 of 5 participants [60%]).
- More OT training may positively impact the DoD-wide use of OTs. Publicizing OT success stories by organizations other than DARPA and DIUx may positively impact the DoD-wide use of OTs. Providing nontraditional contractors with basic training OT training information, for instance, information comparing OTs to traditional procurement agreements may positively impact the DoD-wide use of OTs (3 of 5 participants [60%]).
- Employee discomfort with OTs can lead to adding FAR and DFARS clauses to OTs to protect the Government's interests: this "FAR-creep" can impact the use of OTs. Providing more resources to DoD contracting agents will help them be more favorable to negotiating OTs. Supplying OT training and success metrics to contractors may positively impact the use of OTs (2 of 5 participants [40%]).

Appendix FF. Summary of the Major Findings

Interview. Question/ Conceptual Framework Category	Chapter 4: Organization interviews Major Findings	Chapter 5: RSGS Case Study Major Findings	Chapter 5: Living Foundries Case Study Major Findings
1/ OT Award	Organizations select OTs instead of traditional procurement agreements because OTs help them field new advanced technology capabilities and to do business with non-traditional contractors. The success of OT negotiations is influenced by joint factors such as the parties' prior experience with OTs, mutual trust and open communication, being flexible, and understanding the other party's legal and business needs.	OTs offer flexibility to draft OT terms and conditions to meet the needs of the parties. OTs offer the government the ability to accept funding from the OT contractor. OTs offer contractors flexibility to use commercial instead of FAR terms. The parties must give and take and reach consensus on important terms and conditions for OT negotiations to succeed. Mistrust between the parties can be a source of OT negotiation failure. Both sides must have people educated about OTs.	OTs enable the government to work more effectively with nontraditional contractors. OTs enable enhanced communications and information sharing during OT negotiations. The amount of prior experience that a contractor has with OTs can impact whether OT negotiations succeed.
2/ OT Advantages Versus TPAs	OTs offer more flexible terms and conditions than TPAs and improve communication and collaboration between the parties. OTs are enabling organizations to achieve new technology solutions	OTs are more flexible than traditional procurement agreements because changing an OT is easier, and because the government can accept funding and in-kind contributions from the OT	OTs offer simpler and more flexible terms and conditions than traditional procurement agreements. OTs impact the ability of organizations to attract and work with advanced technology contractors. OTs

	<p>for mission needs. The word is spreading across DoD organizations about the benefits of OTs. This knowledge diffusion has resulted in more DoD organizations using OTs. Cultural factors such as risk-aversion and entrenched bureaucracy, however, continue to oppose more significant impact of OTs in some DoD organizations.</p>	<p>contractor. Fewer rules and regulations apply to OT compared to traditional procurement agreements. OTs enable organizations to do business with nontraditional contractors hesitant to work with the government.</p>	<p>enhance the ability of organizations to achieve technical program goals. DCMA, the DoD organization that administers awarded contracts, and increasingly, awarded OTs, is unfamiliar with OTs, and this may impede the more extensive use of OTs across DoD.</p>
<p>3/ OT Disadvantages Versus TPAs</p>	<p>There is resistance to change [OTs] by contracting officers, program managers, and organization leadership. Procurement professionals and program managers fear losing control of procurement processes and giving up their turf. Some DoD organizations have rigid leadership that punishes procurement failures and mistakes. The audit-prone and risk-intolerant culture of DoD discourage DoD personnel from trying OTs. The stigma OTs got from the Army's failed FCS program continues to impact</p>	<p>During OT negotiations, it can be uncertain what terms and conditions are mandatory to include in the agreement and what can be negotiated. There is a lack of OT expertise at some DoD organizations, and this can protract OT negotiations. Lack of OT expertise can also discourage program managers from being willing to use OTs. DoD organizations are culturally biased to continue to use what they are comfortable with, traditional procurement agreements. Fear of the unknown</p>	<p>OTs can take longer to negotiate than traditional procurement agreements because most terms and conditions are negotiable. OTs are flexible and thus can be changed during performing the OT, which is time-consuming for the parties. OT training should be required as part of a contracting officer's warrant. Only trained contracting officers should be authorized to negotiate and administer OTs.</p>

	use of OTs by DoD organizations.	discourages organizations from using OTs. They will resist if you force them to do something they are not comfortable with such as use OTs.	
4/ Number of OTs Versus TPAs	Traditional procurement agreements are appropriate for most DoD requirements. OT advantages such as speed to award impact the numbers of OTs. OT disadvantages such as negotiation workload impact the numbers of OTs. DoD personnel is unfamiliar with OTs. They are risk-averse to try new procurement tools such as OTs. DoD personnel is used to relying on traditional procurement policies and regulations. There is a lack of training and policy guidance about OTs. There is relatively little DoD leadership support for OTs.	Organizations with R&D missions may have higher numbers of OTs. Organizations with expertise in OTs may have higher numbers of OTs. Organizations that want more control over agreements may have higher numbers of traditional procurement agreements. The personnel resources, time, and creativity needed to negotiate and administer OTs may lead to higher numbers of traditional procurement agreements.	The nature of the DoD organization's mission impacts the numbers of OTs executed compared to traditional procurement agreements. DoD organizations are used to relying on procurement regulations to help them to negotiate and administer traditional procurement agreements. DoD organizations lack confidence in their contracting officers to negotiate OTs because contracting officers have insufficient training and experience with OTs. Contracting officer workload can impact whether an OT or traditional procurement agreement is selected for a prospective procurement.
5/ What can be Changed	Institutional inertia, employee habit and risk aversion cause DoD organizations	Greater emphasis on in-person, creative OT negotiations may impact organization	Adopting OT best practices from other federal agencies such as DHS might

	<p>and personnel to continue to rely on TPAs instead of OTs. Leadership must become actively involved in publicly supporting OTs and in encouraging DoD organizations to use OTs. More guidance, OT templates, sample clauses, and knowledge management tools must be provided to help DoD organizations and personnel more effectively use OTs. DoD organizations and personnel should be given more authority, and independence to use OTs and not suffer adverse career consequences just because an OT fails.</p>	<p>use of OTs. Leadership-supported outreach to nontraditional contractors may impact organization use of OTs. Use of industry-specific OT templates may speed up OT negotiations, which may impact organization use of OTs. DoD should consider the benefits to the commercial partner when negotiating OTs. DoD employees such as contracting officers are comfortable with procurement processes they understand, such as the FAR, and are uncomfortable to try new processes such as OTs. DoD employees will continue to be averse to using new procurement processes such as OTs unless they have employees around them that will help them become familiar with OTs.</p>	<p>positively impact DoD use of OTs. Publicizing OT success stories by organizations other than DARPA and DIUx may positively impact DoD use of OTs. Providing nontraditional contractors with basic OT training information, for instance, information comparing OTs to traditional procurement agreements may positively impact DoD use of OTs. Providing more resources to DoD contracting agents might help them be more willing to use OTs.</p>
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Source: Author.

Appendix GG. Summary of the Potential Causal Mechanisms

(Note: Underlined causal mechanism = a mechanism not replicated in the OT case studies.
 Italicized causal mechanism = a mechanism not found in organization interview mechanisms)

Interview. Question/ Conceptual Framework Category	Organization Interviews: Potential Causal Mechanisms	RSGS OT Case Study: Potential Causal Mechanisms	Living Foundries OT Case Studies: Potential Causal Mechanisms
1/ OT Award	<ul style="list-style-type: none"> • DoD seeks to do business with nontraditional contractors • The parties have prior experience with OTs • The parties want mutual trust during agreement negotiations • The parties want open communications during agreement negotiations • The parties want flexibility during agreement negotiations • The parties seek to understand each other's needs during agreement negotiations 	<ul style="list-style-type: none"> • The parties want flexible agreement terms and conditions • <i>DoD wants to accept funding from the contractor</i> • The parties want consensus in agreement negotiations • The parties mistrust each other, impacting OT negotiations to fail • The parties have personnel educated about OTs 	<ul style="list-style-type: none"> • DoD seeks to more effectively work with nontraditional contractors • The parties want enhanced communication during agreement negotiations • The OT contractor has prior experience with OTs
2/ OT Advantages Versus TPAs	<ul style="list-style-type: none"> • OTs have flexible terms and conditions 	<ul style="list-style-type: none"> • OTs are more flexible than TPAs 	<ul style="list-style-type: none"> • OTs have simpler and more flexible

	<ul style="list-style-type: none"> • OTs improve communication and collaboration between the parties • OTs enable DoD organizations to achieve new technology solutions for mission needs • <u>More DoD organizations are learning about the benefits of OTs</u> • DoD bureaucracy oppose wider use of OTs at some DoD organizations 	<ul style="list-style-type: none"> • OTs have fewer rules and regulations than TPAs • OT have less bureaucracy than TPAs • OTs enable DoD organizations to do business with more nontraditional contractors 	<p>terms and conditions</p> <ul style="list-style-type: none"> • OTs help DoD organizations to work with advanced technology contractors • OTs help DoD organizations to achieve technical program goals • <i>DCMA is unfamiliar with OTs, which impedes the wider use of OTs by DoD</i>
3/ OT Disadvantages Versus TPAs	<ul style="list-style-type: none"> • DoD personnel resist change, including trying OTs • <u>Rigid DoD leadership punishes personnel if an OT fails</u> • DoD's risk-intolerant culture discourages DoD personnel from using OTs • <u>The Army's failed FCS</u> 	<ul style="list-style-type: none"> • <i>DoD personnel are uncertain about what OT terms are mandatory versus negotiable</i> • DoD organizations lack OT expertise, causing protracted OT negotiation. • <i>DoD Program managers are discouraged</i> 	<ul style="list-style-type: none"> • <i>OTs take longer to negotiate than TPAs because most terms and conditions are negotiable</i> • <i>OTs changes during performance of the OT are time-consuming.</i> • Only appropriately trained contracting officers should

	<p><u>program deters some DoD organizations from using OTs</u></p>	<p><i>from using OT by a lack of OT expertise</i></p> <ul style="list-style-type: none"> • DoD organizations are dependent on traditional procurement agreements • DoD organizations don't use OTs because of fear of the unknown • DoD organizations resist if they are forced to use OTs 	<p>be authorized to negotiate and administer OTs</p>
<p>4/ Number of OTs Versus TPAs</p>	<ul style="list-style-type: none"> • <u>TPAs are appropriate for most DoD requirements</u> • OT advantages such as speed to award positively impact the numbers of OTs. • OT disadvantages such as negotiation workload negatively impact the numbers of OTs • DoD personnel are risk-averse to try OTs • DoD personnel are used to relying on familiar procurement 	<ul style="list-style-type: none"> • <i>Organizations with R&D missions have higher numbers of OTs.</i> • Organizations with OT expertise have higher numbers of OTs • Organizations that want more control over agreements have higher numbers of TPAs • <i>OTs require more resources, time and creativity,</i> 	<ul style="list-style-type: none"> • <i>The DoD organization's mission impacts the numbers of OTs</i> • DoD organizations reliance on familiar procurement regulations leads to more TPAs • DoD organizations don't trust their contracting officers to use OTs

	<p>regulations and policies</p> <ul style="list-style-type: none"> • There is insufficient training and policy guidance on OTs • DoD leadership insufficiently supports using OTs 	<p><i>leading to higher numbers of TPAs</i></p>	<ul style="list-style-type: none"> • Contracting officer workload impacts whether an OT is selected for a requirement
5/ What can be Changed	<ul style="list-style-type: none"> • Organizational inertia, employee habit, and risk aversion negatively impact the wider use of OTs • Leadership support for using OTs impacts positively wider use of OTs • Providing additional OT policy guidance positively impacts the wider use of OTs. • <u>Delegating more OT authority to DoD organizations positively impacts the wider use of OTs</u> • <u>Punishing employees just because an OT fails negatively impacts the wider use of OTs</u> 	<ul style="list-style-type: none"> • In-person, creative OT negotiations positively impact the wider use of OTs • Leadership outreach to nontraditional contractors positively impacts the wider use of OTs • Using industry-specific OT templates positively impacts wider use of OTs • <i>OT planning that considers benefits to the OT contractor impacts the wider use of OTs</i> • Employee discomfort with new procurement processes negatively 	<ul style="list-style-type: none"> • <i>Adopting OT best practices from other federal agencies positively impacts the wider use of OTs</i> • Publicizing OT success stories positively impacts the wider use of OTs • <i>Providing OT training to nontraditional contractors positively impacts wider use of OTs</i> • <i>Providing more resources to contracting agents positively impacts the wider use of OTs</i>

		<p>impacts the wider use of OTs</p> <ul style="list-style-type: none">• Employees with co-workers familiar with OTs positively impacts the wider use of OTs	
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Source: Mechanisms are derived from the major findings from Chapter 4 and Chapter 5.

Appendix HH. Consolidated Major Findings and Potential Causal Mechanisms

Interview Question/ Conceptual Framework Category	Consolidated Major Findings	Consolidated Potential Causal Mechanisms
1/ OT Award	i. DoD organizations select OTs instead of TPAs to help field advanced technology capabilities and to work with nontraditional contractors ii. OTs offer flexible terms and conditions, for instance, the government can accept funding from the contractor iii. Successful OT negotiations depend on the parties' prior experience with OTs, mutual trust, open communications, flexibility, and understanding each other's legal and business needs	<ul style="list-style-type: none"> • DoD organization seeks to do business with nontraditional contractors • The parties want flexible terms and conditions during agreement negotiations • The parties have prior experience with OTs • The parties want mutual trust during agreement negotiations • The parties want open communications during agreement negotiations • The parties seek to understand each other's needs during agreement negotiations
2/ OT Advantages Versus TPAs	i. OTs offer simpler and more flexible terms and conditions than TPAs, for instance, changing an OT is easier, and the government can accept funding and in-kind contributions from the OT contractor ii. Fewer rules and regulations apply to OT than TPAs iii. OTs improve communication and collaboration between the parties iv. OTs impact the ability of organizations to attract advanced technology contractors, enabling new technology solutions for mission needs	<ul style="list-style-type: none"> • OTs enable simpler and more flexible terms and conditions • OTs improve communication and collaboration between the parties • OTs enable DoD organizations to attract nontraditional contractors to develop new technologies for mission needs

<p>3/ OT Disadvantages Versus TPAs</p>	<ol style="list-style-type: none"> i. Some employees resist change (OTs) because they fear losing control of procurement processes and turf ii. It is uncertain what OT terms and conditions are mandatory versus negotiable iii. OTs take longer to negotiate than TPAs because most terms are negotiable iv. Changes during an OT are time-consuming v. Lack of OT expertise discourages employees from trying OTs vi. DoD's risk-intolerant culture discourages employees from using OTs and punishes OT failure vii. DCMA is unfamiliar with OTs, impeding the wider use of OTs viii. The Army's failed FCS program continues to impact the wider use of OTs by DoD 	<ul style="list-style-type: none"> • Employees resist change, including trying OTs • Employees are uncertain about what OT terms are mandatory versus negotiable • OTs take longer to negotiate than TPAs • OT changes are time-consuming • Lack of OT expertise discourages employees from using OT • DoD's risk-intolerant culture discourages employees from using OTs • DCMA is unfamiliar with OTs • The Army's failed FCS program deters DoD organizations from using OTs
<p>4/ Number of OTs Versus TPAs</p>	<ol style="list-style-type: none"> i. TPAs are appropriate for most DoD requirements ii. OT advantages such as speed to award impact the numbers of OTs iii. Employee workload impacts the numbers of OTs iv. Organizations with R&D missions have higher numbers of OTs v. DoD leadership insufficiently supports OTs vi. There are insufficient training and policy guidance for OTs vii. The resources and creativity needed to negotiate OTs cause more TPAs 	<ul style="list-style-type: none"> • TPAs are appropriate for most DoD requirements • OT advantages impact the numbers of OTs • OT disadvantages impact the numbers of OTs • Organizations with R&D missions have higher numbers of OTs • DoD leadership insufficiently supports OTs • There are insufficient training and policy guidance for OTs • OT negotiations require more resources and creativity than TPAs • Employee are risk-averse to new procurement processes

	<p>viii. Employees are used to relying on familiar procurement regulations and policies</p> <p>ix. Employees are risk-averse to try new procurement processes such as OTs</p>	
5/ What can be Changed	<p>i. Organizational inertia, employee habit, and risk aversion impact use of OTs</p> <p>ii. Leadership must actively and publicly support OTs</p> <p>iii. More OT policy guidance, OT templates, and knowledge management tools will help employees use OTs</p> <p>iv. Employees should be delegated more authority and independence to use OTs</p> <p>v. Employees should not suffer adverse career consequences just because an OT fails</p> <p>vi. Adopting OT best practices from other federal agencies will help DoD to use OTs</p> <p>vii. Providing training information to nontraditional contractors will make them more willing to use OTs</p> <p>viii. Providing more resources to DoD contracting agents will make them more willing to use OTs</p>	<ul style="list-style-type: none"> • Provide more leadership support for using OTs • Provide more OT policy guidance, templates and knowledge management tools • Delegate more OT authority and independence to employees • Don't punish* employees when an OT fails • Provide OT training to nontraditional contractors • Adopt OT best practices from other federal agencies • Provide more resources to contracting agents

Sources: Consolidated major findings are derived from the major findings from Chapter 4 and Chapter 5. Potential causal mechanisms correspond to the consolidated major findings.

* Punish means adverse career consequences because of being involved in a failed OT. For instance, the employee's promotion is delayed or pay increase is withheld. See the discussion of the research hypothesis in Chapter 1.

Appendix II. Interpretation Outline Tool

Interview Question 1: What do participants believe are institutional and other factors that influence the decision to use an OT instead of a traditional procurement agreement?

Participants discussed **three** primary factors that influence the decision to use an OT instead of a TPA:

- i. DoD organizations select OTs instead of TPAs to help field advanced technology capabilities and to work with nontraditional contractors.

Why?

- Nontraditional contractors are an untapped reservoir of innovative technologies
- There is a pervasive American innovation mystique of an inventor working in his or her garage and developing a breakthrough technology—within DoD; it is believed OTs are a way to attract that inventor to do business with DoD
- Nontraditional contractors are often small businesses, and small businesses have a high social valence with Congress. There is always pressure on DoD to do more business with small businesses
- Discuss Kuyath (1995); Bloch (2002); Stevens (2016); Dix (2003); GAO (2000); GAO (2016); Halchin (2011); ONR (2017)
- Discuss Koning (2016); Jacobs (2015)

- ii. OTs offer flexible terms and conditions, for instance, the government can accept funding from the contractor

Why?

- Many DoD employees believe the DoD procurement system is inflexible and impedes DoD from getting the best value for the dollar
- FAR, CAS, intellectual property, government property and disputes procedures are emblematic of this problem
- OTs offer a way around the problem, enabling DoD to get the best value for the dollar
- Budget pressures motivate DoD organizations to seek new ways to save money
- Discuss Kuyath (1995); Dunn (2009); Dunn (2017); Cassidy (2013); Stevens (2016); Sumption (1999); Dix (2003); GAO (1996); GAO (2000); GAO (2016); Halchin (2016); RAND (2002); ONR (2017)
- Discuss Coombs (1998); Koning (2016); Jacobs (2015)
- SIMILAR FACTORS:

- iii. Successful OT negotiations depend on the parties' prior experience with OTs, mutual trust, open communications, flexibility, and understanding each other's legal and business needs.

Why?

- The FAR and DFARS have rules that control communication between DoD and offerors during source selection. This is sometimes a source of delay and friction to both sides.

- Without the administrative safety net of the FAR and DFARS boilerplate terms and conditions, the parties must negotiate all terms and conditions in an OT. This necessitates close communication. In addition, mutual trust.
- OTs need experienced negotiators on both sides because you start with a blank sheet of paper
- Understanding the business case for the OT from the contractor's perspective helps DoD negotiate win-win OT terms and conditions, which smooths the path to OT success
- Discuss Dunn (2009); Sumption (1999); GAO (2000)
- Discuss Sorensen (2015); Koning (2016)

For Interview Question 1, it is conceivable that these are not the primary factors that influence the decision to select an OT instead of a TPA. What are other possible primary factors and why?

- Leadership pressure to use OTs. Since 2017, there has been renewed DoD leadership interest in using OTs, particularly in the Military Departments. The NDAA for fiscal year 2018 also reflects a renewed congressional interest in DoD more widely using OTs. Thus, there may be top-down pressure on DoD organizations and employees to select an OT instead of a TPA
- Lower competition requirements. OTs have a lower threshold of competition than TPAs. For example, some DoD organizations leverage other organizations existing consortium OTs to award their OTs. The Army's DOTC consortium OT is an excellent example. Therefore, DoD organizations may select OTs because they can avoid the stringent competition requirements that apply to TPAs.
- Litigation avoidance. Several participants noted that OTs are not subject to bid protests, claims and other litigation that delays TPAs. Anecdotally, the researcher has learned that organizations sometimes select OTs to avoid such litigation.
- The contractor offers a high cost share and other incentives. Successful OT negotiations can also depend on how much commercial potential the OT contractor sees in the OT technology. If there is a high potential, the contractor may offer higher cost-share, intellectual property rights, and other incentives to persuade DoD to select an OT.

Interview Question 2: What do participants believe are the advantages of OTs compared to traditional procurement agreements?

Participants discussed **four** primary advantages of OTs:

- i. OTs offer simpler and more flexible terms and conditions than TPAs, for instance, changing an OT is easier, and the government can accept funding and in-kind contributions from the OT contractor

Why?

- Simpler: OTs don't have to include scores of mandatory FAR/DFARS, many that are not relevant to the work

- More flexible: TPAs do not allow DoD to accept funding from the contractor. OTs do, and it is believed this enables DoD to spend less funding on the project
- The parties can craft terms and conditions to meet the particular needs of the project, for instance, payment terms to meet the contractor's business needs
- Discuss flexibility: Kuyath (1995); Dunn (2009); Cassidy (2013); Stevens (2016); Sumption (1999); Dix (2003); GAO (2000); GAO (2016); Halchin (2011); RAND (2002); ONR (2017)
- Discuss Kickert (2011); Blyth (2016); Sorensen (2015)

ii. There are fewer rules and regulations that apply to OT than TPAs

Why?

- OTs are designed to be excluded from the FAR/DFARS
- They are also excluded from DCAA pre and post-award audits
- Local DoD rules on OTs are much simpler than for TPAs, e.g., NMCARS
- Discuss Dunn (2009); Stevens (2016); Sumption (1999); Fike (2009); GAO (2000); RAND (2002)

iii. OTs improve communication and collaboration between the parties

Why?

- OTs do not require the contractor to make formal certifications or give sensitive company cost or pricing information to DoD. This improves the climate for communications
- TPAs have stringent rules on post-RFP communications with offerors
- OTs negotiations require good communications and collaboration to succeed
- OTs involve projects that require close technical cooperation between the parties
- OTs are often smaller dollar value than TPAs. Exploratory, not commercially workable technologies. Less at stake for the contractor about holding information back from DoD
- Discuss Dunn (2009); Stevens (2016); Sumption (1999); Fike (2009); GAO (2000); RAND (2002); ORN (2017)
- Sorensen (2015); Koning (2016); Jacobs (2015)

iv. OTs impact the ability of organizations to attract advanced technology contractors, enabling new technology solutions for mission needs

Why?

- Fewer rules and regulations mean that OTs are appealing to nontraditional contractors averse to the perceived bureaucracy of DoD
- It is believed nontraditional contractors can provide new technology solutions for mission needs
- OTs enable both access to more nontraditional contractors and more advanced technologies
- OT awards don't have to be publicized, are not subject to protest, and can be easily modified and extended
- Solicitation is less streamlined and often requires less investment by an interested contractor

- Non-competitive follow-on production contacts are possible
- Discuss Kuyath (1995); Stevens (2016); Bloch (2002); Dix (2003); GAO (1996); GAO (2000); GAO (2016); RAND (2002)
- Discuss Sorensen (2015); Koning (2016); Jacobs (2015)

For Interview Question 2, it is conceivable that these are not the primary advantages of OT. What are other possible primary factors and why?

- Satisfies DoD leadership and Congress. Renewed congressional and senior DoD leadership interest in keeping DoD ahead of adversaries have influenced DoD organizations to take a new look at using OTs. An advantage of OTs is that they respond to congressional and DoD leadership pressure to field new technologies
- Lower competition threshold and litigation avoidance. Same as for interview question 1.
- The OT literature identified other advantages of OTs. Discuss Kuyath (1995); Dunn (2009)/Halchin (2011); Cassidy (2013); Stevens (2016); ONR (2017)

Interview Question 3: What do participants believe are the disadvantages of OTs compared to traditional procurement agreements?

Participants discussed **eight** primary disadvantages of OTs:

- i. Some employees resist change (OTs) because they fear losing control of procurement processes and turf.

Why?

- DoD hierarchical structure institutionalizes clear authority boundaries
- Employees are used to relying on the FAR/DFARS processes, which have been in place since the mid-1990s
- Long-established procurement processes provide administrative safeguards against risks such as fraud and deflect blame from employees if the agreement fails
- OTs represent a threat to contracting office authority since there is no statutory requirement for agreements officers to be contracting officers
- Discuss Sumption (1999); Stevens (2016); Dunn (2017)
- Discuss Sorensen (2015); Howlett (2009); Panizza (2013)

- ii. It is uncertain what OT terms and conditions are mandatory versus negotiable.

Why?

- There is no list of mandatory OT terms and conditions. In contrast, there is for TPAs
- Traditional procurement contracts use an automatic contract writing system that generates contract templates with all mandatory terms and conditions. OTs don't have this system
- The mandatory terms and conditions in TPAs offer considerable administrative safeguards against fraud and other agreement-related risks

- Agreements officers lack the training and time to sift through all the potential terms and conditions and figure which ones are mandatory
- Discuss Cassidy (2013); Dunn (2009); Stevens (2016)
- Discuss Schmidt (2008); Koning (2016); Coombs (1998); Greif (2004); Sorensen (2015)

- iii. OTs take longer to negotiate than TPAs because most terms are negotiable;
- iv. Changes during an OT are time-consuming.

Why?

- OTs are for advanced technologies, often never developed before. It can be time-consuming to develop terms and conditions for these unique projects
- High-risk OT projects motivate the parties to take their time to negotiate terms and conditions that cover potential risks
- Payment structure and other terms and conditions are often project-unique, and this causes negotiations to be longer than for a TPAs. Same for OT changes.
- The parties' lack of familiarity with OTs means it takes a long time to negotiate terms and conditions. Same for OT changes
- Discuss Dunn (2009); ONR (2017)
- Discuss Greif (2004); Coombs (1998); Koning (2016); Jacobs (2015)

- v. Lack of OT expertise discourages employees from trying OTs.

Why?

- Employees are hesitant to try procurement processes they are unfamiliar with because they might fail
- Failure is punished, for instance, by triggering a DCAA audit or a GAO program review
- Lack of familiarity means that there is a steep learning curve for OTs, which means it will take a long time to negotiate the OT
- Employees have heavy workloads. They don't have time to become familiar with OTs
- There are few OT training resources available to employees
- Employees don't have co-workers familiar with OTs that can help them learn about OTs
- Discuss Stevens (2016); Sumption (1999); Dunn (2017)
- Discuss Clemens (1999); Sorensen (2015); Greif (2004); Coombs (1998); Schmidt (2008)

- vi. DoD's risk-intolerant culture discourages employees from using OTs and punishes any OT failure.

Why?

- FAR/DFARS procurement regulations are premised on accountability of contracting officers and contractors and meant to increase transparency, integrity and accountability Employees face administrative sanctions or even criminal prosecution for some types of administrative failures of TPAs
- Contractors can get negative past performance ratings or be suspended or debarred
- The mission of many DoD organizations is to support warfighters. DoD culture places supporting warfighter and mission paramount to tolerating employee or contractor OT failures

- Discuss Dunn (2017); Stevens (2016); Sumption (1999); GAO (2000)
- Discuss Panizza (2013); Jacobs (2015); Howlett (2009); Sorensen (2015)

vii. DCMA, is unfamiliar with OTs, impeding wider use of OTs.

Why?

- DCMA's mission is to administer TPAs, not OTs
- DCMA does not award OTs or reap technology or reputational benefits from using OTs
- OTs are time-consuming to administer
- DCMA personnel lack training about OTs
- DCMA is reluctant to administer OTs means that DoD organizations have to do it themselves
- Discuss Dunn (2009); Dunn (2017); Stevens (2016)
- Discuss Kickert (2011); Blyth (2016); Sorensen (2015); Panizza (2013); Peters (2005)

viii. The Army's failed FCS program continues to impact the wider use of OTs by DoD.

Why?

- FCS was a high-profile, expensive Army program that failed in the early 2000s
- There was a lot of negative publicity about the failure
- Senator McCain held hearings where Army and DoD personnel were subject to negative publicity
- DoD leadership was negatively affected by the failure
- DoD has a long institutional memory for failure
- Discuss Dunn (2009); Dunn (2017); Sumption (1999)
- Discuss Sorensen (2015); Howlett (2009); Jacobs (2015); Panizza (2013)

For Interview Question 3, it is conceivable that these are not the primary disadvantages of OT. What are other possible primary factors and why?

- The OT literature identified other disadvantages of OTs. Discuss Kuyath (1995); Bloch (2002); Dunn (2017); Stevens (2016); Sumption (1999); Fike (2009)

Interview Question 4: What do participants believe explains the numbers of OTs compared to traditional procurement agreements?

Participants discussed **nine** primary factors that potentially explain the numbers of OTs compared to TPAs:

i. TPAs are appropriate for most DoD requirements.

Why?

- Most DoD requirements are for goods and services
- Most DoD organizations are familiar with how to procure goods and services
- TPAs are appropriate for procuring weapons systems governed by DoD 5000
- Discuss GAO (2016); Fike (2009)

- Discuss Beland & Powell (2016); Kickert (2011); Blyth (2016)

ii. OT advantages such as speed to award impact the numbers of OTs.

Why?

- The faster to award, the more agreements that can be awarded
- Agreements officer and their clients want award timelines to be as short as possible
- There are few protests or other litigation that can delay the award of OTs
- Discuss Dunn (2009); Dunn (2017); GAO (2000)

iii. Employee workload impacts the numbers of OTs.

Why?

- The higher the workload, the less likely that employees will try something new like OTs
- OTs take a long time to negotiate, which makes them unattractive to busy employees
- Busy employees reflect the overall workload of the DoD organization; a busy DoD organization may not have the personnel resources to dedicate to using OTs
- Contracting workforce is getting smaller; contract workload is not getting smaller
- Discuss Stevens (2016); Dunn (2009)
- Discuss Koning (2016); Schmidt (2008); Howlett (2009); Greif (2004)

iv. Organizations with R&D missions have more OTs.

Why?

- OTs are for prototype projects, which means R&D work
- OTs are funded with R&D funding, which R&D organizations have more of than other DoD organizations
- R&D organizations are more willing to take technology risks
- R&D funding is only a small share of overall DoD funding
- Discuss Bloch (2002); Dunn (2009); Stevens (2016); Sumption (2009); Fike (2009); Halchin (2011)

v. There is insufficient DoD leadership support for OTs.

Why?

- Leaders lack OT training
- Leaders see OTs as a source of risk, e.g., congressional attention or GAO/IG audit
- Leaders were brought up in a DoD culture that only used TPAs
- Military leaders are biased towards operational rather than R&D work
- Discuss GAO (1996); Sumption (1999); Steven (2016); Dunn (2009); Kuyath (1995)
- Discuss Kickert (2011); Blyth (2016)

vi. There is a lack of training and policy guidance for OTs.

Why?

- OTs are an exotic, niche practice for DARPA and just a few other R&D organizations

- DAU does not have the time or expertise to train DoD personnel on OTs
- Leaders are not trained on OTs
- OTs are envisioned as being free from rules and regulations. Hence there is a reluctance to issue OT policies
- Discuss Dunn (2017); Steven (2016); Sumption (1999); NDAA FY 2018
- Discuss Howlett (2009); Schmidt (2008); Jacobs (2015); Greif (2004); Sorensen (2015); Clemens (1999)

vii. The resources and creativity needed to negotiate OTs cause more TPAs.

Why?

- It is easier to automatically print out a TPA template than start with a blank sheet of paper to negotiate an OT
- It is difficult to find people who have the expertise to negotiate OTs
- OTs are for advanced technologies, which raises unique and difficult issues to negotiate
- Employees want to stick with what is they know, TPAs
- Discuss Dunn (2009); Cassidy (2013); Stevens (2016); Sumption (1999)
- Discuss Beland & Powell (2016); Kickert (2011); Blyth (2016); Greif (2004); Koning (2016)

viii. Employees are used to relying on familiar procurement regulations and policies.

Why?

- They are trained to use TPAs; they are not trained to use OTs
- The FAR and DFARS cover every problem that can come up in a TPA. There is no such guidance for OTs
- There is a wealth of training resources for TPAs. Not so for OTs
- Employees can lean on their co-workers if they need help on TPAs. Not so for OTs.
- Discuss Dunn (2009); Cassidy (2013); Stevens (2016); Sumption (1999)
- Discuss Beland & Powell (2016); Kickert (2011); Blyth (2016); Sorensen (2015)

ix. Employees are risk-averse to try new procurement processes such as OTs.

Why?

- Fear of audit or administrative sanctions if they make mistakes
- Lack of leadership support for OTs
- Lack of training for OTs
- You start with a blank sheet of paper for OTs
- Discuss Dunn (2009); Stevens (2016); Cassidy (2013); Dunn (2017); Kuyath (1995); GAO (2016)
- Discuss Sorensen (2015); Panizza (2013); Peters (2005); Jacobs (2015); Panizza (2013)

For Interview Question 4, it is conceivable that these are not the primary factors that explain the relative numbers of OTs compared to TPAs. What are other possible primary factors and why?

- OTs are not integrated into DoD 5000. DoD 5000 is the major DoD policy process for managing the life cycle of most DoD program, including procurement. OTs are not part of the policy, and so there is nowhere that program managers can insert OTs into the program life cycle consistent with DoD 5000
- Fiscal limitations. OTs are by nature limited to R&D funding. Most of the DoD budget comprises other categories of funding
- GAO protests. GAO will exercise jurisdiction over a protest that an OT was impermissibly used to procure goods and services where a TPA should have been used
- OT statute definition of a prototype. The OT statute definition of prototype excludes most of what DoD procures

Interview Question 5: What do participants believe are factors that could be changed to impact DoD use of OTs?

Participants discussed **eight** primary disadvantages of OTs:

- i. Organizational inertia, employee habit, and risk aversion impact use of OTs.

Why?

- Employees are habituated to rely on TPAs because processes for TPAs have been in place since the 1990s
- The FAR and DFARS provide familiar processes for negotiating/administering TPAs
- There are lots of available TPA training
- There is no reward for using OTs that outweighs the risk of something going wrong
- There are organizational support and co-workers who are familiar with TPAs
- Discuss Dunn (2009); Dunn (2017); Stevens (2016)
- Discuss Beland & Rocco (2016); Greif (2004); Jacobs (2015); Schmidt (2008)

- ii. Leadership must actively and publicly support OTs.

Why?

- Without active leadership support, there is no top-down signal it's OK to use OTs
- Some employees still believe OTs are illegal
- Few DoD policies publicize leadership support of OTs
- Discuss Sumption (1999)
- Discuss Panizza (2013); Howlett (2009); Sorenson (2015); Kickert (2011); Blyth (2016)

- iii. More OT policy guidance, OT templates, and knowledge management tools will help employees use OTs.

Why?

- Templates will help jumpstart use of OTs at organizations new to OTs
- An OT knowledge sharing website would help spread OT best practices
- More policy guidance would help employees use OTs
- A website like FedBizOpps would be useful for advertising OT opportunities
- Would make employees more comfortable to use OTs

- Discuss Dunn (2009); Dunn (2017); Stevens (2016); Sumption (1999)
- Discuss Clemens (1999); Sorensen (2015); Coombs (1998); Koning (2016); Howlett (2009)

iv. Employees should be delegated more authority, and independence to use OTs.

Why?

- Only warranted contracting officers can award OTs
- Some DoD organizations do not have delegated OT authority
- Leadership must trust employees to negotiate and administer OTs
- Discuss Panizza (2013); Jacobs (2015); Howlett (2009); Sorensen (2015); Peters (2005)

v. Employees should not suffer adverse career consequences just because an OT fails.

Why?

- Without administrative safeguards of the FAR and DFARS, employees believe they will be blamed if they leave out an important term and condition from the OT
- DoD IG and GAO audits are common in DoD when there is a program failure
- Hotline complaints and DCIS investigations are common
- There is a lot of congressional oversight of DoD
- OTs are prone to failure because of the nature of advanced R&D work
- Discuss Kuyath (1995); Dunn (2009)
- Discuss Sorensen (2015); Howlett (2009); Panizza (2013)

vi. Adopting OT best practices from other federal agencies will help DoD to use OTs.

Why?

- Other agencies such as DHS, TSA, and NASA have valuable OT experience
- There is no systematic knowledge sharing about OTs among federal agencies
- Discuss Stevens (2016); Dunn (2017); Cassidy (2013)

vii. Providing nontraditional contractors with basic OT training information will make them more willing to use OTs.

Why?

- Training will help nontraditional contractors learn about the benefits of OTs
- Training will help dispel myths about doing business with DoD
- Training will help OT negotiations go more smoothly and quickly
- Discuss Coombs (1998); Sorensen (2015); Kickert (2011); Blyth (2016)

viii. Providing more resources to DoD contracting agents will make them more willing to use OTs.

Why?

- Contracting agents, like much of DoD, are still unfamiliar with OTs
- OTs are time-consuming to administer because agents are unfamiliar with OTs

- Contracting agents have a heavy workload, and OTs take more time and effort to award than TPAs
- Contracting agents are earning fees based on the number of contracts administered
- Discuss Clemens (1999); Coombs (1998); Jacobs (2015)

For Interview Question 5, it is conceivable that these are not the primary change factors that could impact the wider use of OTs. What are other possible primary factors and why?

The OT and the historical institutionalism literature identified other potential change factors.

- Kuyath (1995)–IP rights among consortium members
- Bloch (2002)–attracts mostly traditional contractors
- Dunn (2017)–need new offices for OTs; more flexible fiscal and contracting laws
- Stevens (2016)–need dedicated OT writing system
- Schmidt (2008)–Discursive institutionalism
- Beland & Powell (2016)–Layering, displacement, drift, conversion, and exhaustion

Appendix JJ. Conclusions and Recommendations Consistency Chart

Recommendation for establishing a knowledge management resources website for OTs

Consolidated Major Finding (Finding #)	Interpretation and Synthesis	Conclusions	Recommendation
Lack of OT expertise discourages employees from trying OTs (3v)	<ul style="list-style-type: none"> • At some DoD organizations it's hard to find employees with expertise in OTs • DoD R&D organizations have more employees with OT expertise • Mutability: FAR and DFARS may leave no room for employees to try OTs • Limited knowledge, attention, coordination costs bias employees to not use OTs. • TPAs may be a form of KMP • Employee background ideational abilities perpetuate compliance with FAR/DFARS and using TPAs 	<p>DoD organizations must provide employees and nontraditional contractors adequate OT education and training resources to support the wider use of OTs</p> <p>Providing such education and training will encourage more nontraditional contractors to propose to DoD OT funding opportunities and will speed up OT negotiations with these contractors</p>	<p>Establish a knowledge management resources website for OTs. The website should be publicly accessible by DoD employees and by contractors. The website can be managed by a DoD organization such as DAU or by a contractor such a consortium OT management firm</p>
There are insufficient training and policy guidance for OTs (3vi)	<ul style="list-style-type: none"> • DoD workforce trained to use TPAs, not OTs • OT officials lack OT expertise • There needs to be mandatory OT training for the 	See above	See above

	<p>entire procurement workforce</p> <ul style="list-style-type: none"> • NDAA Fiscal Year 2018 directs DoD to provide OT training to the technical and contracting personnel involved in OTs • Local OT training by DoD organizations could cause neo-homeostatic change, resulting in wider use of OTs across DoD 		
<p>Providing training information to nontraditional contractors will make them more willing to use OTs (5vii)</p>	<ul style="list-style-type: none"> • OT training would make nontraditional contractors more willing to seek DoD OT funding opportunities • Educated contractors will help OT negotiations go more smoothly • Contractor participants discussed needs for OT templates; e.g., an OT cheat sheet to help them negotiate their first OT with DoD • Training could lead to new KMPs that would foster wider acceptance of OTs private industry • Providing training to contractors may cause endogenous 	<p>Like DoD employees, contractors also need to be provided with accessible, effective OT training</p> <p>Providing more training will cause more nontraditional contractors to propose to DoD OT funding opportunities and speed up OT negotiations with these contractors</p>	<p>See above</p>

	institutional change through policy layering, conversion, or drift		
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Source: Table format adapted from Bloomberg (2012).

Recommendation for providing OT checklists and templates

Consolidated Major Finding (Finding #)	Interpretation and Synthesis	Conclusions	Recommendation
It is uncertain what OT terms are mandatory versus negotiable (3ii)	<ul style="list-style-type: none"> • OTs present a big knowledge challenge for most employees • No standardized terms and conditions for OTs like for TPAs • OTs may be too flexible; A blank sheet of paper problem • Discursive institutionalism: employee background abilities bias them towards TPAs • Ideational institutionalism: employees need more information to make change, use OTs • Path dependence on TPAs due to lack of knowledge and time for OTs • There is no automatic agreement writing system for OTs 	DoD employees and contractors lack policy guidance and knowledge management tools—OT checklists and OT templates—to help them more widely use OTs	<p>Provide a list of federal laws that apply to OTs</p> <p>Provide generic OT templates for the most common types of OTs, including fixed-fee, cost-sharing, and consortia OTs</p>

<p>OTs take longer to negotiate than TPAs because most terms are negotiable (3iii)</p>	<ul style="list-style-type: none"> • It's a myth that OTs are quicker to negotiate than TPAs • Employees may be discouraged to use OTs when they learn that OTs take longer than TPA to negotiate • This consolidated major finding is not reflected in the prior OT literature • Path dependence: employee limited knowledge, attention and coordination costs create dependence on TPAs • FAR/DFARS are sedimented rules that create path dependence on TPAs 	<p>It is not widely known an OT can take longer to negotiate than a comparable TPA</p>	<p>See above</p>
<p>More OT policy guidance, OT templates, and knowledge management tools will help employees use OTs (5iii)</p>	<ul style="list-style-type: none"> • Participants stated the need for OT templates • One-stop DoD website with OT literature, guidance, including templates • OT training should be a mandatory part of DoD procurement workforce training 	<p>DoD organizations and employees need more policy guidance and knowledge management tools to help them more widely use OTs</p>	<p>See above</p>

Source: Table format adapted from Bloomberg (2012).

Recommendation for mandatory use of FPDS for unclassified OT awards

Consolidated Major Finding (Finding #)	Interpretation and Synthesis	Conclusions	Recommendation
Organizations with R&D missions have higher numbers of OTs (4iv)	<ul style="list-style-type: none"> • Participants theorized about the missions of other DoD organizations and how that might impact the use of OTs • Participants seemed uninformed about the numbers and types of OTs used by other organizations • Lack of knowledge of OTs may be as much a driver of OT use as the organization's mission • The researcher found FPDS is incomplete: It does not accurately show the numbers and locations where OTs are being awarded across DoD • In fiscal year 2010, Congress required DoD to use of FPDS to track OTs • Congress has shown renewed interest to require DoD to report OT statistics 	<p>If DoD organizations were required to use FPDS to record their OT awards, DoD could use the data develop reliable quantitative metrics for assessing and measuring the success of the DoD OT program</p> <p>Using FPDS to record OT awards would provide DoD with data to respond to congressional requirements for reporting DoD OT statistics, for instance, the numbers of OTs awarded by DoD organization with R&D missions versus those with combat support missions</p>	<p>Make FPDS mandatory for recording unclassified OT awards, including OT projects awarded under consortium OTs</p> <p>Use FDPS data to develop quantitative metrics for assessing the DoD OT program</p>

Source: Table format adapted from Bloomberg (2012).

Recommendation for updating OT policies and regulations

Consolidated Major Finding (Finding #)	Interpretation and Synthesis	Conclusions	Recommendation
Leadership must actively and publicly support OTs (5ii)	<ul style="list-style-type: none"> • The DoD OT Guide, alone, is enough guidance for most employees • Senior DoD leadership endorsement of OTs is needed • DoD leadership needs OT training • Lack of knowledge of OTs leads to resistance to change, using OTs 	<p>DoD has insufficient policy guidance to show strong leadership support for OTs and to encourage the wider use of OTs</p> <p>But DoD leadership should be cautious about creating additional policy guidance to show its support for OTs</p>	<p>Update existing policy guidance to show strong leadership support for OTs and establish circumstances where OTs are preferred.</p> <p>Update BBP 3.0, DoDI 5000, and the DAG. Also revise the OT regulations in 32 C.F.R. Part 3.</p>

Source: Table format adapted from Bloomberg (2012).

Recommendation for updating core certification standards contracting officers and program management to include OT training and experience requirements;
Delegating OT authority to Level 3 certified program managers

Employees should be delegated more authority and independence to use OTs (5iv)	<ul style="list-style-type: none"> • Participants discussed bottlenecks in getting OT authority delegated to their organization • Participants discussed difficulty in finding experienced agreements officers • Participants also discussed that workload may 	<p>DoD has a shortage of experienced agreements officers to negotiate and award OTs</p> <p>Experienced program managers are critical to negotiating and administering OTs</p> <p>OT training and experience is not currently part of the DoD core certification</p>	<p>Update DAU contracting officer and program management core certification standards to include OT training and experience requirements</p> <p>Delegate OT authority to Level 3 certified program</p>
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	<p>deter agreements officers from OTs</p> <ul style="list-style-type: none"> • OT projects involve advanced technology, which sometimes can only be understood by the program manager. • Leadership mistrust of employees appeared to underlie this consolidated major finding • OT training is necessary to make sure that employees responsibly use delegated OT authority • Delegated OT authority may be a quasi-parameter • Power relationships: Lack of delegated OT authority may show organization or employee political conflicts with their chain of command • Lack of delegated OT authority may contribute to an organizational decline 	<p>requirements for these employees.</p>	<p>managers. Authority should be exercised under the authority of the local SPE, HCA or other designated DoD procurement official</p>
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Source: Table format adapted from Bloomberg (2012).

Recommendation for establishing an interagency OT working group

Consolidated Major Finding (Finding #)	Interpretation and Synthesis	Conclusions	Recommendation
Adopting OT best practices from other federal agencies will help DoD use OTs (5vi)	<ul style="list-style-type: none"> • Participants discussed looking to other federal agencies (DHS) for new approaches for using OTs • GAO report finds that other federal agencies are using OTs 	DoD does not formally share OT best practices with other federal agencies to improve the DoD OT program	Establish an interagency working group to share OT best practices with other federal agencies that have OT authority

Source: Table format adapted from Bloomberg (2012).