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MBA PROFESSIONAL REPORT

ANALYSIS OF EXPEDITED DEFENSE CONTRACTING METHODS IN THE ACQUISITION OF EMERGING TECHNOLOGY

December 2016

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THE ACQUISITION OF EMERGING TECHNOLOGY**

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Submitted in partial fulfillment of the requirements for the degree of

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ABSTRACT

The future of national security rests on more than nuclear weapons, heavy equipment, and conventional forces. Increasingly, security depends on technological advantage, innovation, and asymmetric technology exploitation. Future conflicts will share limited semblance to historical conflicts due to the technology exploitation that characterizes modern warfare. As the U.S. government's share of research and development (R&D) funding shrinks and defense budgets continue to decline, the Department of Defense (DOD) will increasingly depend on new innovative firms to maintain a technological advantage. Such firms inherently differ from traditional defense acquisition in process and culture. They also enjoy demand from broader domestic and international markets. R&D funding sources affect rights to intellectual property—a major concern for technology firms. The DOD has authority for applying non-traditional contracting methods to better adapt to this competitive marketplace. This project studied non-traditional contracting tools at the DOD's disposal and their merits, with an analysis of how the DOD can effectively leverage its existing and potential authorities to be a competitive buyer in the emerging technology market. Practitioners in the field provided first-hand accounts of their awareness and experience with non-traditional contracting. Findings include the benefits and limitations of non-traditional methods with recommendations for their selective application.

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LIST OF ACRONYMS AND ABBREVIATIONS

ACC	Army Contracting Command
AFRL	Air Force Research Laboratory
APDP	Acquisition Professional Development Program
BBP	Better Buying Power
CFR	Code of Federal Regulations
CO	Contracting Officer
CRADA	Cooperative Research and Development Agreements
CSO	Commercial Solutions Opening
DARPA	Defense Advanced Research Projects Agency
DAU	Defense Acquisition University
DFARS	Defense Federal Acquisition Regulation Supplement
DIUx	Defense Innovation Unit Experimental
DOD	Department of Defense
FAR	Federal Acquisition Regulation
FedBizOpps	Federal Business Opportunities web portal
FFRDC	federally funded research and development center
FLC	Federal Laboratory Consortium
FY	fiscal year
GAO	Government Accountability Office
GSA	Government Services Administration
IP	intellectual property
JAG	Judge Advocate General
MBA	Master of Business Administration
MRAP	mine-resistant ambush protected
NASA	National Aeronautics and Space Administration
NDAA	National Defense Authorization Act
OMB	Office of Management and Budget
OSTP	White House Office of Science and Technology Policy
OT	other transaction
OTA	Other Transaction Authority

PALT	Procurement Administrative Lead Time
PEO	program executive office(r)
PIA	partnership intermediary agreement
PM	program manager
QDR	Quadrennial Defense Review
R&D	research and development
RFP	Request for Proposal
RIP	Rapid Innovation Program
ROM	rough order of magnitude
SAM	System for Award Management
SAT	simplified acquisition threshold
SBA	Small Business Administration
SBC	small business concern

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I. INTRODUCTION

Over the years, much progress has been made to help Federal agencies gain greater access to the innovation and synergies generated by the commercial marketplace. Despite this progress, the standard procurement processes that agencies rely on to meet most of their needs may remain highly complex and enigmatic for companies that are not traditional government contractors. (White House Office of Science and Technology Policy [OSTP], 2014, p. 2)

A. BACKGROUND

The Department of Defense (DOD) enjoys a degree of success in expedited procurement via the Defense Advanced Research Projects Agency (DARPA) and Special Operations Command (SOCOM). Similar to those organizations, the Defense Innovation Unit Experimental (DIUx) model relies on expedited contracting methods to partner with non-traditional suppliers. The success of the DIUx venture rests on, among other things, contracting flexibility and full utilization of expedited procurement methods. Any shortcomings in this combination may significantly inhibit defense procurement of emerging technology. Unlike generic commercial-off-the-shelf items, emerging technology has no substitutes. And unlike non-commercial defense-specific items, emerging technology enjoys high demand from private industry buyers—the DOD’s competition in technology acquisition. In this niche sector of emerging technology, the DOD does not have the luxury of employing a traditional, slow, tedious, and burdensome procurement process compared to the private sector that translates into price and schedule growth. In the area of emerging technology, the Department simply risks losing opportunities to procure emerging technology altogether. That jeopardizes the Department’s ability to maintain competitive military technological advantage for the national defense strategy.

With shrinking post-wartime budgets and the shadow of long-term spending decline hanging over the DOD, the government will need to fully leverage all technology development sources to capture the most innovative and affordable solutions. Growing

technology companies not traditionally involved in defense sales offer promising opportunities for innovative products with defense application. According to OSTP (2014), “many of these companies can offer Federal agencies valuable new ways of solving long-standing problems and cost-effective alternatives for meeting everyday needs” (p. 2).

In 2015, Secretary Carter announced the formation of DIUx with a mission to serve as a bridge between U.S. military and companies operating at the cutting edge of technology (“Work with Us,” n.d.). The future of national defense and military superiority rests on technological advantage over adversaries. The DOD relies on several types of sources in technology and engineering development. They include internal government laboratories, federally funded research and development centers (FFRDCs), academic research institutions, traditional defense contractors, and non-traditional suppliers of unique solutions in the areas of cybersecurity, robotics, artificial intelligence, and machine learning. Capturing technological advantage requires leveraging these diverse sources of innovation. This report analyzes the last, non-traditional component.

The non-traditional component has the potential to achieve great leaps in innovation based on market incentives, particularly compared to the more measured progress found in government laboratories and traditional defense suppliers. To capture technology development opportunities in the commercial market for innovation, the Department will need to evolve into being and acting as a *competitive customer* to the emerging technology market sector—a sector that currently has limited experience with government procurement philosophy, has reservations in pursuing the government market, or has outright apprehension of government intent with regard to intellectual property. While the notion of acting competitively in the marketplace encompasses the overall acquisition effort, this report is focused on the available expedited contracting tools and the DOD’s knowledge, understanding, and application thereof. To close the gap in the Department’s competitiveness as a buyer of emerging technology, we attempt to identify barriers to efficient and effective technology acquisition from a contracting perspective. Possible causes that limit defense technology acquisition efforts may include the inadequate application of existing expedited contracting tools based on a lack of

knowledge, training, or awareness in the defense acquisition workforce. Additionally, contracting's risk-averse culture and conventional thinking may also inhibit flexibility. Finally, the existing expedited methods may actually be inadequate even when applied to the fullest extent.

Every four years, the DOD issues a review to update strategic defense posture and priorities.

The 2014 Quadrennial Defense Review (QDR) established innovation as a central line of effort in the national defense strategy of the United States. Asymmetric technological capabilities enabling the U.S. to maintain a decisive military advantage over its adversaries and peer competitors are steadily eroding. Globalization has contributed significantly to a renaissance in commercial innovation fueled by venture capital investment that far exceeds the research and development budget of the Department of Defense (DOD). As a result, the global technology 'water line' has risen faster than DOD's ability to outpace it alone. More so, rogue nations and non-state actors have gained ready access to new technology leading to an advancement in their offensive capabilities. (DIUx, n.d., p. 1)

Consequently, Secretary Carter launched the Defense Innovation Unit Experimental, or DIUx, "to accelerate the development, procurement, and integration of commercially derived disruptive capabilities to maintain defense technological lead" (DIUx, n.d., p. 2). With the premise of technology advancement and application as an item of immediate importance, DIUx mission is to serve as a bridge between U.S. military and companies operating at the cutting edge of technology ("Work with Us," n.d.).

B. PURPOSE STATEMENT

The purpose of this MBA project is to analyze currently available expedited procurement methods to quickly acquire emerging technologies from small businesses; compare the methods to those used by DARPA, SOCOM, and Rapid Procurement Cells; and determine barriers to the DOD's ability to harness technology acquisitions from prospective non-traditional suppliers. We intend to develop recommendations for DIUx to enable expedited acquisition of emerging and innovative products from leading engineering communities like Silicon Valley.

C. RESEARCH QUESTION

In this research, we answer the following question: How should DIUx leverage expedited contracting methods to acquire emerging technological innovations? In answering this question, we highlight the strengths and weaknesses inherent in currently available expedited procurement methods that bolster or reduce the DOD's ability to be a competitive customer in this fast-paced industry.

D. RESEARCH BENEFITS AND LIMITATIONS

This project analyzes currently authorized expedited procurement methods to assess the acquisition community's level of awareness of and familiarity with non-traditional procurement tools. We also seek to assess training programs for expedited procurement methods and the actual application of expedited methods in defense acquisition activities. We interviewed representatives from DOD contracting offices and considered vendors' concerns with the DOD's acquisition processes to make findings-based recommendations. The recommendations may lead to improve training programs, adapt policies, and influence Better Buying Power guidance, DOD and Service instructions, acquisition regulations, and legislative actions.

The report acknowledges broad acquisition matters such as program management and interaction between multi-functional partners in the acquisition processes and communities. While the overall acquisition effort involves processes with a series of steps, this report focuses on the procurement tools and their application. Changes to DOD 5000 processes and systemic adjustments in the acquisition process are beyond the scope of this project. Incentivizing the established traditional defense industrial companies to become more inherently innovative is also beyond the scope of this analysis and can serve as a promising area for further research.

The intent of this research is to determine the optimal utilization of the various contracting methods within the boundaries of the existing acquisition framework. Our review of contracting methods focuses on existing tools, their flexibility, and their merits. Other factors that limit acquisition flexibility—fiscal appropriations, statutory

requirements, regulatory guidance, and organizational culture—can compound and cumulatively complicate the challenges.

We rely on operational feedback from acquisition professionals to gauge the effectiveness of non-traditional procurement tools and their adequacy in conducting emerging technology acquisitions. The interview sample is limited to several respondents from various DOD organizations. While we believe the respondents, their organizations, and their responses adequately reflect the overall rapid acquisition community, they still represent only a limited sample.

With this project, we attempt to reconcile the gap between a shrinking technology development cycle and a widening acquisition timeline. Our expectation is that defense-sensitive technology will continue to proliferate at accelerating speeds. We also believe that increase in research spending will enhance innovation. Lastly, even our most expedited procurement methods may still be too slow, too restrictive, or too burdensome for this fast-moving technology industry.

E. ORGANIZATION OF REPORT

Chapter I presented the background, problem statement, purpose statement, research questions, and benefits and limitations of our research. In Chapter II, we present a review of the literature pertaining to the traditional contracting process, the expedited contracting process, and current congressional and organizational initiatives in the expedited procurement arena. In Chapter III, we discuss our data collection method, which involved phone interviews with DOD contracting units that use expedited contracting processes on a daily basis. In Chapter IV, we analyze the results of the interviews and provide recommendations. Finally, in Chapter V, we summarize our results and recommend further areas for research on this topic.

F. SUMMARY

The U.S. has been maintaining decades of technological edge over conventional adversaries. As technology became cheaper and more accessible, the U.S. technological advantage still remains but with increasing vulnerabilities to exploitation. Developments

in emerging technology open new fronts in unconventional warfare, allowing previous strengths to become new vulnerabilities. Spending large amounts of money on technology no longer assures security, superiority, or advantage. In today's complicated and dynamic environment, the DOD needs to take an offensive and defensive approach to innovation: capturing leading edge defense technology *before* adversaries *and* preventing adversaries' access to the same. This is a daunting task because the DOD's traditional acquisition processes are not fully compatible with the fast-paced nature of the emerging technology market. A growing flow of emerging technology comes from new and innovative firms without experience in government contracting and with no need or desire to adapt to the DOD's traditional contracting process. This project studies the DOD's efforts to capture the innovative technology market through non-traditional contracting methods.

II. LITERATURE REVIEW

A. INTRODUCTION

This literature review examines the differences between how the government traditionally conducts acquisitions and how we can expedite the process to buy emerging technology. As the DOD extends itself into Silicon Valley, a major hurdle the DOD must overcome is how to attract non-traditional vendors¹—a process that likely involves alleviating the risk-reducing methods and processes of the traditional contracting process. We begin with a review of the traditional contracting process, then we provide an overview of the expedited contracting process, and conclude with multiple government initiatives meant to provide a faster means of contracting for emerging technology.

B. TRADITIONAL CONTRACTING PROCESS

“The traditional contracting process involves all activities associated with identifying and justifying a [traditional] mission need, formulating an acquisition strategy to meet the need, and implementing the strategy by means of a contractual relationship with a vendor” (DOD, 2012, p. 311). This process consists of three phases: pre-solicitation, solicitation, and source selection (see Figure 1).

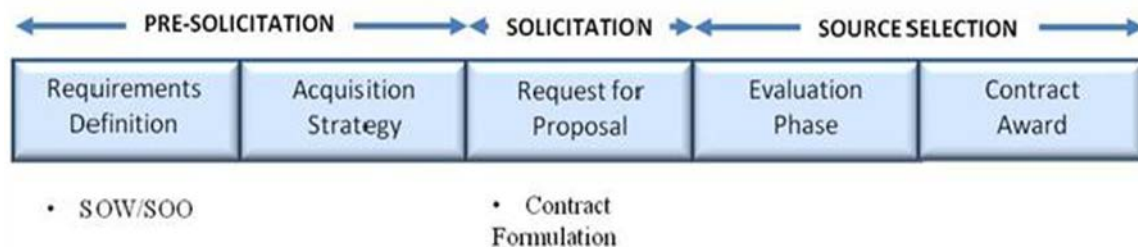


Figure 1. The Acquisition Process. Source: DOD (2012).

¹The DOD’s OT Guide for Prototype Contracts defines a non-traditional defense contractor as a “business unit that has not, for a period of at least one year prior to the date of the OT agreement, entered into or performed on (1) any contract that is subject to full coverage under the cost accounting standards prescribed pursuant to section 26 of the Office of Federal Procurement Policy Act (41 U.S.C. 422) and the regulations implementing such section; or (2) any other contract in excess of \$700,000 to carry out prototype projects or to perform basic, applied, or advanced research projects for a Federal agency that is subject to the Federal Acquisition Regulation” (Gansler, 2002, p. 7).

1. Requirements Definition

The requirement definition step involves capturing all customer requirements, performing market research, and constructing a Statement of Work (SOW) or Statement of Objectives (SOO). The most vital part of this step is to properly and thoroughly understand what the customer needs. If the customer's requirement is not fully identifiable, a SOO is used to seek vendor solutions to the requirement, and a vendor-proposed SOW is incorporated into the contract. Market research is conducted to determine the number of capable vendors that can satisfy the agency's requirement, to discover whether commercially available or non-developmental items can be used, and to determine the typical prices and practices of vendors engaged in producing the product or service (Federal Acquisition Regulation [FAR] 10.001(a)(3), 2016). With the requirement well defined and market research conducted, the acquisition team can begin to construct their strategy.

2. Acquisition Strategy

Acquisition planning (or creating the strategy for the acquisition) is the “process by which the efforts of all personnel responsible for an acquisition are coordinated and integrated through a comprehensive plan for fulfilling the agency need in a timely manner and at a reasonable cost. It includes developing the overall strategy for managing the acquisition” (FAR 2.101, 2016). Planning and market research are meant to promote the acquisition of commercial items, full and open competition, selection of the appropriate contract type, and appropriate consideration of pre-existing contracts prior to the award of any new contracts (FAR 7.102(a), 2016). When the plan is in place, the team can solicit the requirement. The contracting officer, in consultation with the rest of acquisition team, determines the appropriate contracting method and vehicle at this stage. Policy and regulations guide decisions toward traditional procurement approach, unless market conditions, required item or other external factors require the use of non-traditional methods.

3. Request for Proposal

A Request for Proposal (RFP) is a “formal negotiated solicitation issued for buys over \$100,000 resulting in a formal contract [and] includes the contract form, contract clauses, work statements, specifications, delivery schedule, and payment terms” (DOD, 2012, p. 314). If an RFP requires manufacturing, the solicitation could include production cost, quality systems, manufacturing development and demonstration, production, quality, and manufacturing efficiencies, producibility engineering, and finally, process control and capability (DOD, 2012, p. 314). With the exception of commercial item acquisitions and in excess of the simplified acquisition threshold (SAT), an RFP should allow at least 30 days for proposal responses from vendors (FAR 5.203(c), 2016). However, if a solicitation for commercial items is synopsized for less than 30 days and receives only one proposal, the contracting officer (CO) shall resolicit for at least another 30 days (Defense Federal Acquisition Regulation Supplement [DFARS] 205.203 (S-70), 2016). The ultimate goal of issuing an RFP is to receive vendors’ proposals to fulfill the customer’s needs. Once the proposals are received, the acquisition team evaluates them (source selection) to determine the winning vendor and issue a contract (see Figure 2).

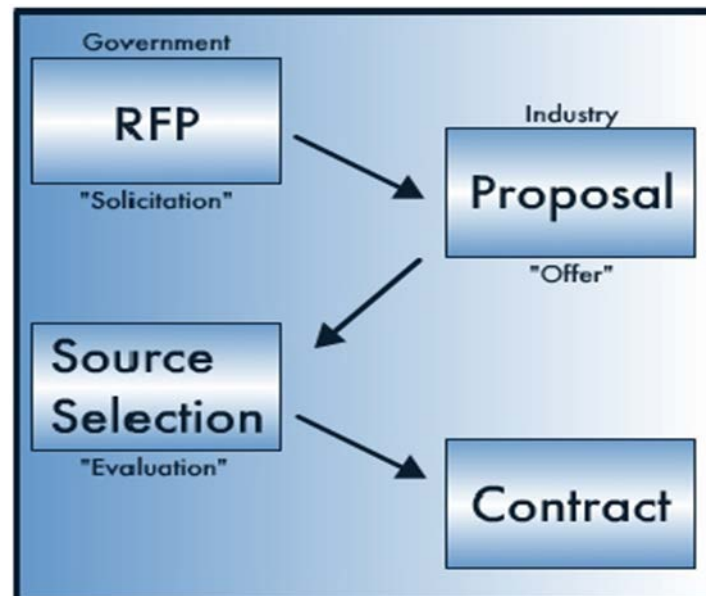


Figure 2. Contract Award Steps. Source: DOD (2012).

4. Evaluation Phase

The evaluation phase focuses on how offerors proposals met the requirements in the solicitation. Evaluations may be conducted using various rating methods, such as color or adjectival ratings. Required evaluation factors include “price or cost and quality, using one or more non-cost factors such as past performance, compliance technical excellence, management capability, and personnel qualifications” (DOD, 2012, p. 315).

Detailed lists of what the evaluation process includes are provided in RFP Section L, Instructions to Offerors; and the basis of how the evaluation is conducted is detailed in Section M, Evaluation Factors for Award. Best value is determined using either the lowest price, technically acceptable or the tradeoff method of evaluation (the details of the chosen method are provided in both Sections L and M of the RFP). “All factors and significant sub-factors that affect the contract award and their relative importance shall be clearly stated in the solicitation” (FAR 15.304(d), 2016).

Evaluation of proposals is based on the criteria, factors, and priority as specified in the solicitation. If it is determined that negotiations are in order, the government must first establish a competitive range with only the highest rated proposals, and comply with the procedures of FAR 15.306 (2016).

5. Contract Award

The final step in the traditional contracting process is awarding the contract based on the completion of final evaluations, conclusion of negotiations (if applicable), and approval of the required clearance documentation. Upon completion of the evaluation process, the successful offeror is notified by the contracting officer through an executed contract award document (Standard Form [SF] 26, SF 33, SF 1449, or DOD Document [DD] 1155) (DOD, 2012, pp. 315–316). Additionally, a notice is sent to all unsuccessful offerors. Each notice contains the “number of offerors solicited; the number of proposals received; the name and address of each offeror receiving an award; items, quantities, and any stated unit prices of each award; and the reason(s) the offeror’s proposal was not accepted, unless the price information reveals the reason” (FAR 15.503(b)(1), 2016).

Finally, the contracting officer will publish a synopsis of the contract award on FedBizOpps as a final notice to all interested vendors.

The traditional contracting path sets a structure for the workforce to follow. It values fairness, thoroughness, and consistency over speed or efficiency. It aligns with the government's socio-economic and policy objectives. The administrative burdens accumulate for both the procuring organizations and offerors with negative effects on efficiency, competitiveness of the government as a buyer, and competition among vendors willing to meet government's administrative requirements. Traditional methods attempt to mitigate procedural risks to the government. Acquisition process can go awry for a multitude of reasons from unethical behavior to poor contractor performance. Traditional methods provide a degree of oversight over acquisition workforce conduct and contractor performance. This oversight also enables procuring offices to better withstand outside scrutiny. But in following the traditional procurement policy in an effort to mitigate risk, the defense acquisition community largely disregards the accompanying costs of traditional acquisition methods. This compliance-centered approach offers little flexibility but provides a sense of process security and integrity to the acquisition community and oversight bodies.

Expedited procurement methods, as the name suggests, offer greater speed and efficiency in attempting to meet acquisition objectives. In employing these alternate tools, the government frees itself from some of the administrative burdens and lowers the administrative threshold for vendors to pursue government markets. While expedited methods offer the potential to better capture competitive markets at a lower cost and tighter schedule, they also carry perceived or real risk growth in oversight, compliance, and performance. The spectrum of traditional to expedited methods involves a trade-off between compliance and speed. Speed also affects risk levels in the acquisition process and product performance.

C. EXPEDITED CONTRACTING PROCESS

This section is divided into three areas: expedited solicitation methods, expedited contracting methods, and the agreements that are made using these two methods to buy emerging technology.

1. Expedited Solicitation Methods

Expedited solicitation methods allow flexibility with the schedule or breadth of requirements compared to the more rigid traditional solicitation method. Expedited solicitations can also remain open on a continuous basis in recognition that technology may not yet exist to satisfy the requirements or businesses may need to develop a technological solution rather than just a price proposal in response to non-traditional solicitation. When the requirements themselves are not defined, non-traditional solicitations allow the government to seek for a solution in very broad terms and offer vendors an opportunity at structuring the solution.

a. Broad Agency Announcement

According to FAR 35.016(a), “Broad Agency Announcements (BAA) may be used by agencies to fulfill their requirements for scientific study and experimentation directed toward advancing the state-of-the-art technology or increasing knowledge or understanding rather than focusing on a specific system or hardware solution” (2016). The BAA issues a set of needs (similar to the SOO) based on the agency’s future areas of interest. While the BAA solicitation method is not typically used for specific product acquisitions, it can be used to demonstrate a technological concept. Also similar to the traditional solicitation, the BAA expects offerors to propose their company’s solution to solve the need, but a lengthy full proposal is not required unless the government requests one.

As with all DOD acquisitions, “proposals received as a result of the BAA shall be evaluated in accordance with evaluation criteria specified therein through a peer or scientific review process. Written evaluation reports on individual proposals will be necessary but proposals need not be evaluated against each other since they are not

submitted in accordance with a common work statement” (FAR 35.016(f), 2016). This peer or scientific review process is dramatically faster than the traditional evaluation process directed in FAR 15.3 and described in the previous section. For BAAs, “the primary basis for selecting proposals for acceptance shall be technical, importance to agency programs, and fund availability. Cost realism and reasonableness shall also be considered to the extent appropriate” (FAR 36.016(e), 2016).

There are two types of BAAs used to achieve the government’s desired outcome; the “One-Step” method requires offerors to only submit proposed solutions, while the “Two-Step” method requires a white paper submission followed by a proposal if the submitter is chosen as a viable contender. A white paper is a brief summary of an offeror’s technical approach (with a rough-order-of-magnitude [ROM] price associated) that generally does not exceed two to three pages in length. Per the Air Force Research Laboratory’s (2015) *Guide for Industry*, “The objective of a BAA is to encourage participation by science and technology firms and educational institutions in meeting Air Force Research and Development goals for innovative ideas and approaches for research that is general in nature” (p. 4).

An advantage to using the BAA solicitation method is the ability to award to multiple offerors. The BAA states the type of awards that can be made, the period of performance, and the anticipated dollar range for each award. According to FAR Part 6, “An award under the technique is treated as meeting the statutory requirement in the Competition in Contracting Act for full and open competition” (FAR 6.102(d)(2), 2016). There is no guarantee of a government contract resulting from the BAA process.

b. Commercial Solutions Opening

A Commercial Solutions Opening (CSO) is very similar to a BAA in that it is an open-ended (typically five-year), two-step process for requesting solution briefs and proposals to solve government questions/problems. DIUx released its own CSO in mid-2016 when it began working with the Army Contracting Command–New Jersey. The process begins with the CSO identifying the current capabilities of interest to the DOD. Next, Silicon Valley vendors submit their solution briefs to solve the identified

technological shortcomings. After they review solution briefs, DIUx contacts the vendor within 30 days if they are interested in the product. Some vendors may even be invited to pitch or demonstrate their product at DIUx. If the product or solution is determined a viable solution, the vendor is invited to provide a full proposal, including a statement of work and a cost proposal. Similar to a BAA, an RFP does not guarantee that a contract will be let or that funding is available to purchase the product. Finally, should a proposal be deemed viable and funds are available, the government may choose to make an award. Awards are fixed price and are made using Other Transaction (OT) Authority.

Unlike the BAA, the CSO results in the award of prototype projects, which include not only commercially available technologies fueled by commercial or strategic investment, but also concept demonstrations, pilots, and agile development activities that can incrementally improve commercial technologies or concepts for defense application (DIUx, n.d., p. 2). Additionally, the following are a few of the many streamlined benefits of the CSO: minimal corporate and technical information is provided up front, the payment terms are negotiable, there is a 30-day response to solution briefs, intellectual property (IP) rights are negotiable (government does not plan to control IP), vendors receive direct feedback from DOD customers in the field, and there is potential for follow-on funding for promising technologies and sponsorship of user test cases for prototypes and possible follow-on production (DIUx, n.d., p. 2).

2. Expedited Contracting Methods

The following section details the current expedited contracting methods available to contracting offices. A detailed comparison of each method is included in Appendix A.

a. Rapid Technology Prototyping

Using a BAA to solicit,

rapid prototyping ... shall provide for the use of innovative technologies to rapidly develop fieldable prototypes to demonstrate new capabilities and meet emerging military needs. The objective of an acquisition program under this pathway shall be to field a prototype that can be demonstrated in an operational environment and provide for a residual

operational capability within five years of the development of an approved requirement. (S. Rep. No. 114-49, 2015, p. 167)

The rapid technology prototyping method consists of “multiple, small, fast, and cheap acquisitions to ‘try out’ innovative technologies. This method allows the government rapid testing of available cutting-edge, unproven, but potentially transformative technological advancements” (OSTP, 2014, p. 5). Success in development and adaptation of these emerging technologies typically ranges from 10%–30% of all submitted technologies based on substantial trial and error. Most prototyping projects are carried out at the vendor’s facility and can last anywhere from three to six months. Awards are made using firm fixed price contracts with an emphasis placed on non-traditional vendor participation. The best use of this method is to test innovative solutions presented by non-traditional vendors.

b. Staged Contracts

Also using a BAA to solicit solutions, the staged contract method is used to “scale proven solutions and expedite the rapid and inexpensive assessment of many existing or prototyping private sector technologies ... using a three-phase evaluation process: short concept paper, invite-only full proposal, and a subsequent one-to-two-year pilot evaluation period” (OSTP, 2014, p. 7). The underlying advantage of this method is that it allows the government to test out emerging technologies prior to full commitment and/or transferring them to programs of record. The best use of this method is the ability to scale proven solutions by non-traditional vendors.

c. Milestone-Based Competitions

As noted in the Innovative Contracting Case Studies document, “A milestone-based competition is an innovative contracting model that promotes competition among a stable pool of selected offerors across a series of clear, technically feasible milestones, with payment withheld until the associated, agreed-upon milestone is completed” (OSTP, 2014, p. 9). This method is similar to the other methods because it uses the BAA to solicit; however, the idea of only competing among vetted vendors differentiates this method from prototyping methods. Furthermore, small businesses in the pool are granted

additional access to federal financial resources and private contributions to complete the task. The best use of this method is to fulfill an agency's immediate technological need or the need to discover whether novel solutions exist by non-traditional vendors.

d. Incentive Prizes

Another method for discovering innovative solutions to government problems involves the use of incentive prizes. This method gets its authority from the America COMPETES Reauthorization Act of 2010 that permits agencies to “carry out a program to award prizes competitively to stimulate innovation that has the potential to advance the mission of the respective agency” (Stevenson-Wydler Technology Innovation Act of 1980). Incentive prizes are used to attract non-traditional vendors and teams toward task completion knowing they only get paid for successful completion of the task. Incentives have been used by many government entities to advance R&D activities in health care, energy, education, and military operations. Finally, incentive prizes are not governed by the FAR, and thus are subject to fewer administrative burdens. The best use of this method is to fulfill an agency's immediate technological needs or to discover whether non-traditional vendors have novel solutions to a problem.

e. Challenge-Based Acquisitions

When the government has an established requirement or need but is struggling with actual specifications, a challenge-based acquisition may be appropriate. This method is a great way to find solutions that may already exist in the market. The government benefits by only paying for the solution that meets the requirements of the challenge, and it can be quicker than other methods because it does not require the full development of a solution. For a project to be a candidate for this method, the following conditions must be met: (1) the ability to determine the user's need and decomposition of complex requirements, (2) the ability to communicate user experiences and needs to industry, (3) the full design and execution of the challenge event, and (4) the ability to analyze the results and provide contract or task order awards (OSTP, 2014, p. 13). This method uses the BAA solicitation process and has been used successfully by many agencies. The best use of this method is to test innovative solutions presented by non-traditional vendors.

3. Agreements

Agreements are contract vehicles used in securing a transaction between the government and the non-traditional vendor. These agreements are less structured than traditional contracts; however, basic requirements such as a vendor's eligibility in the System for Award Management (SAM) and their ability to receive a government agreement or contract are still the same. This section details five types of agreements that can result from expedited contracting methods.

a. Other Transactions Authority

To afford certain procuring offices and non-traditional suppliers an avenue to bypass administrative acquisition burdens, the Congress-authorized prototype development outside the FAR. Early users of this special authority referred to this type of procurements as "other transactions."

Other Transactions Authority (OTA or OT) are agreements that allow an agency to enter into agreements "other than" standard government contracts or other traditional mechanisms. Agreements under this authority are generally not subject to federal laws and regulations applicable to federal contracts or financial assistance, allowing agencies to customize their other transaction agreements to help meet project requirements and mission needs. (GAO, 2016, p. 1)

This authority is granted per 10 U.S.C. 2371 and Section 845 of the National Defense Authorization Act (NDAA). Traditional contracting statutes that do not apply to OTAs include the Truth in Negotiations Act, Competition in Contracting Act, Contract Disputes Act, and even the Procurement Integrity Act. "OTA gives agencies the flexibility necessary to develop agreements tailored to a particular transaction" (Willsey, 2016). This selective authority does have statutes of its own to follow, and in accordance with the "*Other Transactions*" Authority (OT) Guide for Prototype Projects, OTAs may only be used in the following conditions:

1. There is at least one non-traditional defense contractor participating to a significant extent in the prototype project
2. No non-traditional defense contractor is participating to a significant extent in the prototype project, but at least one of the following circumstances exists:

2a. At least one third of the total cost of the prototype project is to be paid out of funds provided by the parties to the transaction other than the federal Government.

2b. 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 procurement contract. (Gansler, 2002, p. 8)

In a report to Congress by L. Elaine Halchin (2011) of the Congressional Research Service, an OT is described as “a special vehicle used by federal agencies for obtaining or advancing [R&D] or prototypes” (p. 4). The report covers the origins of OTs and the congressional byproducts authorizing their use by various governmental departments. Recent legislation included in the fiscal year (FY) 2016 NDAA added provisions to increase small business and non-traditional offerors in the technology sector, as well as continuing the usage of the OTA for FY 2016. A recent DARPA presentation described OT advantages:

Under certain circumstances, OTs may be used as the acquisition instrument to 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 DOD or improvements of platforms, systems, components, or materials in use by the armed forces. (Ulrey, 2016, slide 9)

Recognizing the need to reach the emerging technology base and acquire related technologies, Under Secretary of Defense for Acquisition, Technology, and Logistics (USD [AT&L]) Frank Kendall (2015) emphasized the need for OTAs by directing the development of a handbook of methods and best practices to “develop recommendations to increase access to innovation within the national security environment through engaging non-traditional suppliers, entrepreneurs, and inventors” (Kendall, 2015, p. 16).

b. Cooperative Research and Development Agreement

Cooperative Research and Development Agreements (CRADAs) provide federal laboratories with an extremely flexible vehicle to facilitate the transfer of commercially useful technologies from federal laboratories to the nonfederal sector. CRADAs support the broader purpose of providing

the means for a federal laboratory to leverage its R&D efforts consistent with the laboratory's mission. (Federal Laboratory Consortium, 2011, pp. 33–34)

The laboratory director, in deciding what CRADA to use, gives special consideration to small or other disadvantaged businesses on an as needed basis. “The laboratory director also gives preference to business units located in the U.S. and to business units that agree that products or inventions made under the CRADA, or produced through the use of such inventions, will be manufactured substantially in the United States” (Cooperative Research and Development Agreements, 2011).

c. Technology Investment Agreements

Formerly known as Other Transactions for Research, a Technology Investment Agreement (TIA) is similar to a CRADA in that it “requires substantial federal involvement in the technical or management aspects of the project” (10 C.F.R. 603.1340). This type of agreement is useful when an agency needs to stimulate research or has a need for research support. This initiative cannot duplicate other research conducted simultaneously with other programs, and government funds may not exceed the total amount provided in the cost share agreement (Ulrey, 2016, slide 8).

d. Vendor Loan Agreements

A vendor loan agreement (VLA, see Appendix B for an example) allows the government to evaluate supplier equipment in an operational environment for a specified period. The supplier provides the equipment at no cost to the government and bears all expenses for transportation, installation, removal, operational supplies, and repair parts. The supplier is also responsible for scheduled and unscheduled maintenance of the equipment. The agreement does not obligate the government to purchase the item(s) in the future (DAU, 2011). Special Operations Command (SOCOM) contracting officers have used VLAs, and one contracting officer (KO) notes that “a government testing report is the payment in lieu of cash” (KO at SOCOM, personal communication, August 3, 2016).

e. Partnership Intermediary Agreements

A partnership intermediary agreement (PIA) gains its authority from 15 U.S.C. 3715, and is a “contract or memorandum of understanding with an intermediary that provides for the performance of services for a federal laboratory to increase cooperative or joint activities with small businesses, institutions of higher education or educational institutions” (Use of Partnership Intermediaries, 2015). SOCOM uses PIAs to collaborate, innovate, prototype, and explore with industry, labs, and other academic partners. For example, “the SOFWERX is a facility that allows SOCOM and their partners to conduct hands-on experiments to develop a solution and then come back with a white paper solution to the BAA” (KO at SOCOM, personal communication, August 3, 2016).

D. CONGRESSIONAL AND ORGANIZATIONAL INITIATIVES

Beyond the processes detailed in Section C of this chapter, Congress has long recognized the need for speed to acquire emerging technology in the current market and has passed multiple initiatives as part of the annual National Defense Authorization Act (NDAA). The DOD has initiatives to “create stronger incentives for industry prime contractors and DOD program managers to ‘pull’ technology solutions from the DOD’s Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) investments, from non-traditional suppliers, and from entrepreneurs—and for inventors to ‘push’ innovative ideas to program offices and other acquisition organizations” (Kendall, 2015, p. 16).

1. Small Business Innovation Research

According to the Small Business Administration (SBA), the purpose of the SBIR program is to “stimulate technological innovation; use small businesses to meet Federal R&D needs; foster and encourage participation by socially and economically disadvantaged small businesses in technological innovation; and increase private sector commercialization of innovations ... thereby increasing competition, productivity and economic growth” (SBA, 2014a, p. 3). The focus of SBIR is to “ensure that the DOD makes it as easy as possible for small businesses with creative and innovative

technologies to work with the DOD and have their technologies included in the products that the DOD acquires” (Kendall, 2015, p. 16). Participation in SBIR program precludes companies from using outside venture capital funding for the same project. This exclusionary funding policy limits the opportunity to pool various funding sources for development of dual-use technology.

2. Small Business Technology Transfer Research

Congress established the Small Business Technology Transfer (STTR) program in 1992 in an effort to utilize industry and institutional problem solving techniques. “It is similar in structure to SBIR and funds cooperative research and development projects with small businesses in partnership with not-for-profit research institutions (such as universities) to move research into the marketplace” (DOD, 2015). The STTR program’s purpose is to “stimulate a partnership of ideas and technologies between innovative small business concerns (SBCs) and Research Institutions through Federally-funded R&D” (SBA, 2014b, p. 3). STTRs and SBIRs are small business enablers designed to go beyond basic research to create government and nongovernmental products.

3. Rapid Innovation Program

The Rapid Innovation Program (RIP), known as the Rapid Innovation Fund within the DOD, was originally established in the FY 2011 NDAA, and is “designed to fund innovative technologies, reduce life-cycle costs, address technical risks, improve timeliness of test and evaluation outcomes, and rapidly insert technologies needed to meet critical national security needs” (NDAA for FY 2016, 2015, p. 51). According to the Defense Innovation Marketplace website, some of the key requirements to utilizing the RIF include innovative technology stimulation, the reduction of acquisition and life cycle costs, improved timeliness and thoroughness of Test & Evaluation (T&E), technology transfer within 24 months of award, and a cost of less than \$3 million (DOD, 2016, slide 5). Of the 263 awards made in FY 2011 and FY 2012 under the RIP, over 90% were made to small businesses, and a majority of those were leveraged from investments made under the SBIR program (NDAA for FY 2016, pp. 51–52). The RIP is designed to “deliver new technologies to acquisition programs and operational units that

may not otherwise be funded or evaluated given the fiscal constraints and traditional program management processes currently in place” (NDAA for FY 2016, p. 52). “The [RIP] process is somewhat lengthy (see Figure 3), taking about 18 months to implement and award contracts, but interest from contractors has been high” (GAO, 2015, p. 6).

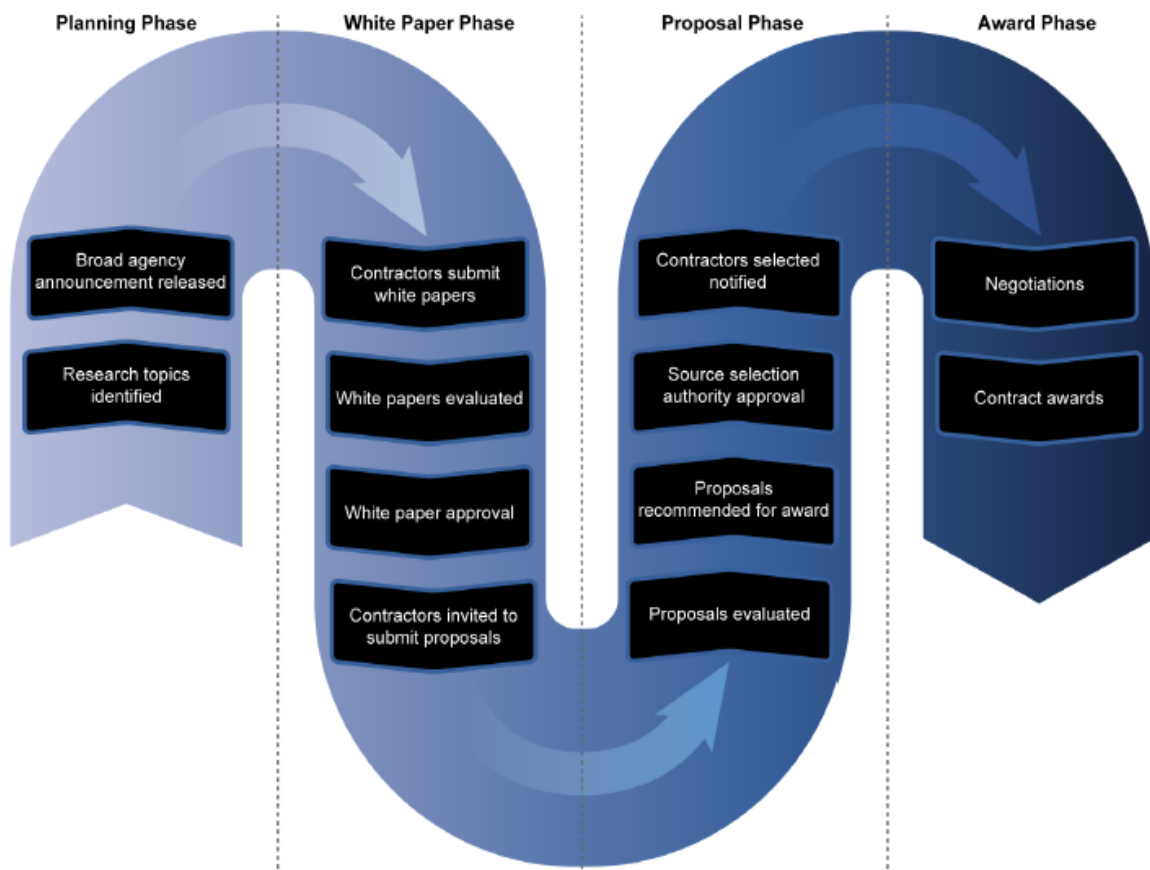


Figure 3. Rapid Innovation Program Project Selection Process.
Source: GAO (2015).

E. SUMMARY

The federal acquisition process is established in regulation that dictates how government acquisition professionals purchase services to supplies, but in a fast-paced and ever-changing technology environment, acquisition professionals must step outside of day-to-day practices and apply expedited contracting methods to procure emerging technology. If an organization is trying to scale a proven solution, the staged contract

method should be used. Likewise, if an organization is interested in testing innovative solutions, the challenge-based acquisition or the rapid technology prototyping methods are most appropriate. Use of the milestone-based contract or the incentive prize would best fulfill an agency's need to discover novel solutions from non-traditional vendors. Should a solution or product be deemed viable to meet the needs of the government, an OTA or SBIR/STTR agreement can further expedite the process. These agreements are not governed by the FAR and provide a commercial-like means of buying products or allowing the government to try out prototypes for further application.

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III. METHODOLOGY

A. INTRODUCTION

This project explores contracting methods available for DIUx and other DOD organizations charged with quickly and efficiently procuring emerging technology solutions from innovative companies. The DOD enjoys a degree of success in expedited procurement with DARPA and SOCOM. Similar to those organizations, the DIUx model relies on expedited contracting methods to partner with non-traditional suppliers.

Our research involves a combination of policy review, interviews, and previous technology procurement cases to investigate available acquisition processes across agencies and departments. Common responses may indicate persistent issues ripe for reform. Conflicting accounts may show how offices manage the acquisition environment differently with different outcomes. This collective feedback and analysis sheds light on the efficacy of differing practices and philosophies.

Using interviews helps identify underlying differences between the intended acquisition path and actual processes. Discovering the actual process details requires personal interaction with stakeholders to glean delay-causing factors. The interviewees did not previously know the researchers and participated in the telephone interviews voluntarily.

B. DATA COLLECTION

We attended a DIUx small business town hall and a series of meetings with DIUx staff to learn their processes in accomplishing market outreach mission. We studied recent literature in the areas of rapid procurement, non-traditional contracting tools, and innovative technology acquisition. The operational feedback was based on interviews and written responses to our questions from defense acquisition professionals in various rapid acquisition offices.

Protecting the identity of the interviewees permitted sincere and forthright feedback. Our research sample includes telephone interviews with five acquisition

professionals and written responses from three acquisition professionals. The respondents include civil service employees and military officers from different branches. The respondents are assigned to various commands, services, and defense agencies. Their acquisition experience levels vary from mid-level professionals and managers to senior contracting leaders. Their familiarity with non-traditional tools ranges from limited exposure to and awareness of the tools, to consistent use of the tools, to advocating policy and authorization for existing and future rapid procurement tools. We adapted interview questions from Senator Carper's letter to Office of Management and Budget (OMB) Director Donovan. Senator Carper, ranking member of the Senate Homeland Security and Governmental Affairs Committee, asked OMB Director Donovan about the acquisition process and the government's ability to work around roadblocks "to better understand what OMB is doing to shepherd the use of innovative and emerging cybersecurity tools at Federal agencies" (Carper, 2016, p. 2). The interview questions are listed in Appendix C.

C. SUMMARY

This study relies on multiple sources to assess the DOD's flexibility in procuring emerging technology. Acquisition statutes, regulations, and policies represent the currently available expedited procurement methods. Recent DOD history offers a number of acquisition cases in which the Department attempted to leverage the market to capture technology. Monitoring DIUx efforts provides a current view of reaching out to a promising technology market. Finally, interviewees provide experience-based feedback on the merits and shortcomings of applying various procurement tools.

IV. RESULTS

A. INTRODUCTION

This research is focused on the DOD's ability to competitively acquire innovative or disruptive technology with potential offensive or defense applications. *Competitive* in this instance refers not to the full and open competition in soliciting offers. To the contrary, it refers to the government competing against other prospective buyers for emerging technology and steering engineering talent and private capital toward the development of innovative defense solutions.

Such disruptive technology comes with disproportionately powerful or even exponential potential to attack or defend against a stronger opponent or a more powerful conventional system. In this technological race, unconventional or asymmetric technology is also used to defend against other disruptive technology. Some of the growing areas include cyber, robotics, artificial intelligence, machine learning, and data analytics. We refer to these kinds of technologies in this research effort.

B. MARKET ENVIRONMENT

The market dynamics behind innovation, its funding and return on investment influence industry behavior and interaction with the government. The extent of government R&D funding for a given product drives the level of government's IP rights. Companies view IP rights as a zero-sum game of their market size opportunity and ability to charge monopolistic prices in those markets.

The defense industrial base, while historically a source of major innovations, pursues new technology development in conjunction with sales of existing products. For the established defense companies, protecting incumbent market share is as important, or situationally even more important, than attempts at developing new products. The new technology comes with high development costs, and may ultimately replace products in the existing portfolio. Additionally, the new technology may generate lower profit margins than existing product lines. The goals of maximizing profit and developing new technology compete to some extent, and may even crowd each other out. That leaves less

than maximum incentive for traditional defense suppliers to leverage opportunities for new technology development.

Further, as suppliers grow into mature companies, their organizational bureaucracy tends to hinder creativity and development. Therefore, the DOD needs continuous access to technology development companies as they emerge. New businesses in pursuit of emerging technology operate with fewer internal conflicts. They normally do not yet have a portfolio of products and cash cows to promote and defend in lieu of developing new products. Rather they aggressively pursue product creation to build a portfolio. They operate as relatively flat, agile, and focused organizations. In turn, they seek out similarly-organized buyers for fast and efficient sales to sustain their operations. “Flat, agile, and focused” does not closely describe the defense acquisition enterprise.

The market environment changed for the DOD when emerging technology became cheaper and more accessible for adversaries, while, concurrently, the U.S. government’s share of R&D funding shrank, leaving the private sector to shoulder a growing part of the overall R&D efforts. At least in the near future, the shrinking defense budgets will further accelerate the shift from government-funded research to privately-funded research, leaving the government with less leverage to acquire new technology after its privately funded development. This leaves the DOD in a less advantageous buying position, one that relies on privately developed technology and includes increased competition among buyers. In terms of vulnerability, the DOD’s—and indeed the U. S.—reliance on technology exposes us to cyber-attacks and necessitates both offensive and defensive technological advantage.

C. WARTIME RAPID ACQUISITION AUTHORITY

The DOD employs wartime rapid procurement authorization in times of large scale conflict. Defense acquisition shifts into a frenzy during conflict. The Pentagon outsources logistics and life support services to private companies and focuses on core missions. Once major operations wind down, so does the flexibility to mitigate some of the time-consuming steps in the traditional procurement process.

The Army's rapid fielding office at program executive office (PEO) Soldier serves as an example of actual and perceived procurement challenges. In wartime, PEO Soldier utilizes rapid acquisition authority to expedite procurement. For existing commercial solutions, PEO Soldier taps into existing contract vehicles in the DOD and beyond (e.g., GSA vehicles) to acquire necessary products. The department has largely viewed procurement schedule as a trade-off against cost and quality, with schedule rising in importance during wartime and cost consciousness prevailing in peacetime.

The Mine-Resistant Ambush Protected (MRAP) program is another recent example of a rapid system acquisition during wartime. At the height of the Iraq war, Secretary Gates pulled the MRAP program out of the traditional acquisition path and into a direct report program to him to expedite development and production. With improvised explosive devices killing the highest number of troops in war zone, every day of acquisition, production and fielding schedule mattered in the effort to avoid at least some of the daily casualties. That pressure created a staggering schedule premium to field the vehicles to the ground forces. Each day of lead time was of personal interest to Secretary Gates.

D. RESULTS

Our research of DIUx and acquisition policies yielded some authorized avenues to deviate from traditional contracting to expedite procurement and to adapt to private procurement methods. However, non-traditional contracting methods then triggered questions of level of awareness and acceptability of such tools among contracting offices. Even the authority to exercise non-traditional tools such as other transactions is limited among government agencies. To learn answers to these questions, we spoke to acquisition staff in the field. In addition to reviewing statutes, regulations, and policies, we conducted a series of interviews with various defense organizations engaged in rapid procurement.

The feedback varied based on the organization, mission, size, and type of items procured. We observed that as an organization grew in size, its contracting flexibility diminished. Understandably, as the procured products shifted from R&D items to

commercial items, contracting options narrowed accordingly. On the research and innovation-heavy end of the scale lies DARPA, whose mission is centered on developing solutions. Its small size and inherent agility allow for unconventional contracting methods. In fact, DARPA not only pioneered technological development within the DOD and broader government, DARPA led the advocacy for DOD policy and legislative action for securing the authority to conduct other transactions.

1. Awareness of Expedited Solicitation/Contracting Methods and Training of the Users

If you are not in a typically innovative organization, chance are you have never heard of nor worked with expedited contracting methods. This lack of knowledge was echoed during our interviews by multiple individuals; “Not a lot of people know what OTAs are out there, or how to use them. It would be nice to know what tools are out there for the non-traditional contracting officer” (program manager [PM] at PEO Soldier and KO at SOCOM, personal communication, August 3, 2016). This lack of awareness of expedited solicitation and contracting methods is a central and common theme found across many organizations, whether they acquire innovative technology or not. Beyond internal government awareness, many non-traditional vendors are just as unaware of the steps taken to ease burdensome traditional contracting methods. In one interview, a PM noted that they solicited with a BAA to seek innovative solutions, but the vendors did not know it was even out there awaiting responses: “Success sometimes depends on training the vendors on how to conduct business with the government” (KO at SOCOM, personal communication, August 3, 2016). “It comes down to education and fear that someone is going to do something wrong; the legal guys won’t let us try it” (PM at PEO Soldier, personal communication, August 3, 2016). So, the need for awareness internally is matched with the need to get the word out to industry.

“Defense Acquisition University doesn’t offer courses for this sort of contracting; we had to seek out training slides from faculty at the Naval Postgraduate School and DARPA to create a way forward, basically just trial and error” (KO at SOCOM, personal communication, August 3, 2016). SOCOM realizes the potential benefits of these expedited contracting methods and is establishing a special unit to spearhead their future

use. This unit is also tasked with educating the KOs, PMs, and requirement owners about the proper use of these methods (KO at SOCOM, personal communication, August 3, 2016). “[The] Air Force Research Laboratory (AFRL) gave a presentation on using ‘Other Transactions’ and a vendor demonstration forum for new technology companies to show attendees their new technology solutions” (KO at Gunter Annex, personal communication, August 6, 2016).

2. Authority to Use

The authority for using Other Transactions is codified in 10 U.S.C. 2371 and 10 U.S.C. 2371b for prototypes. DARPA and NASA received initial authorizations, with other government agencies following suit. However, authorization for use is only the first step. It is indicative of the tool’s accessibility to a given agency, not the extent of use for that agency. Therefore, pursuit of authorization and subsequent application is indicative of a combination of the agency’s need for non-traditional acquisition (authorization) and its cultural environment that allows (or does not allow) the agency to successfully utilize the authorization (application). According to GAO (2016) compilation, Congress authorized other transactions for 11 executive agencies in various permanent, temporary or program-specific forms (p. 6). The agencies in turn vary on the extent of using OTs and types of OT activities. Figure 4 depicts the 11 agencies with congressional authority as of FY 2016 with types of OT activities by agency.

Agency	Types of activities		
	RD&D	Prototype	Other
Advanced Research Projects Agency – Energy (ARPA-E)	✓		
Department of Defense (DOD)	✓	✓	
Department of Energy (DOE)	✓		
Department of Health and Human Services (HHS)	✓		
Department of Homeland Security (DHS)	✓	✓	
Department of Transportation (DOT)	✓		
Domestic Nuclear Detection Office (DNDO) ^a			
Federal Aviation Administration (FAA)	✓		✓
National Aeronautics and Space Administration (NASA) ^b	✓		✓
National Institutes of Health (NIH)	✓		
Transportation Security Administration (TSA)			✓

Sources: GAO analysis of agencies' information. | GAO-16-209

^aDNDO did not enter into any other transaction agreements for fiscal years 2010 through 2014.

^bAccording to officials, NASA does not acquire RD&D services using other transaction agreements, but it does conduct collaborative RD&D activities with outside entities.

Figure 4. Agency Use of Other Transaction Agreements for FY 2010 through FY 2014. Source: GAO (2016).

3. Flexibility of Options

In the operational community, SOCOM focuses on unconventional warfare missions. Unconventional warfare does not occur in vacuum. Operators using special tactics are best supported with unconventional contracting tools used to acquire customized solutions. SOCOM is small enough to avoid the bureaucracy that bogs down larger buying organizations, yet big enough to attract vendors. SOCOM employs other transactions and, more recently, technology investment agreements for development and prototyping.

“As long as you are able to justify your reasoning and able to work within the rules and regulations you are using, it’s fine. [Furthermore,] you tell me I can write an agreement and don’t need the FAR, let’s do it” (KO at SOCOM, personal communication, August 3, 2016). DARPA, as an early advocate and regular user of other

transactions, also lauds the merits and benefits of the flexibility afforded in the authorization.

An expert in ballistics at PEO Soldier, however, expressed skepticism with regard to other transactions. Given the magnitude of developing, procuring, and fielding equipment for the whole Army, a large-scale acquisition requires production of millions of items. Our research focused on the development of technology or capability and the acquisition of prototypes, limited items, or intangibles such as software. The interview audience discussed broader challenges across the acquisition cycle. Representatives at PEO Soldier consider the entire acquisition process when planning and streamlining efforts. The large scale of their procurements arose as a point of distinction from our other interviews. Other transactions apply to prototyping and development. They allow a degree of flexibility to make acquisitions in a wide range of research, development and technology maturation efforts. They do not afford mass procurement of developed products.

Like most traditional procurement offices, PEO Soldier lacks the authority to exercise other transactions. Could the authority to issue other transactions be beneficial to organizations such as PEO Soldier? For an affirmative response to hold true, the buying agency must be hindered in acquisition of R&D or prototyping.

Notably, the feedback from PEO Soldier indicated that for development and prototyping, BAAs and traditional contracting methods meets the needs of the organization. The challenge lies in shifting from technology development to force-wide mass procurement. That is where, despite the availability of technology and prototypes, the Army's acquisition of service-wide equipment slows to a crawl. Procuring standardized gear for the force requires layers of approvals that can set the process back by many months, or even years. Congressional fiscal appropriations and political attempts to steer large-scale procurements also play a greater role as the procurement size grows. While the feedback on the benefits, use and applicability of other transactions varied among the respondents, the comparative ease of using them in smaller organizations became apparent during our interviews.

In PEO Soldier's case, the ballistic protection program office met its objectives with developing an improved helmet without using other transactions. Their challenge lay in launching large scale production. Other transactions were of no benefit in later stages of the acquisition. This example shows the dynamics of a moving bottleneck in the process. While the acquisition needs to clear the initial hurdle of developing the necessary technology, large-scale procurements are likely to run into other hurdles as they progress toward becoming programs of record.

Even in R&D efforts, PEO Soldier relied on the more traditional procurement methods with BAA solicitations. The ballistic program office found available traditional tools adequate for ballistic protection research, development, testing, and prototyping. They did not seek other transaction authority or expect enhanced access to product developers through non-traditional contracting tools. Given an opportunity, they would have pursued an OT-type tool for large-scale procurement, if there were such a vehicle. The market for ballistic defense procurements is small, comprised of relatively few companies and few, if any, prospective new entrants. PEO Soldier can adequately reach the ballistics R&D market with traditional tools.

But the program office acknowledged that other transactions can help the DOD better reach other markets in emerging technology, cybersecurity, prototyping, or small scale acquisitions that will not translate to a program of record. DARPA, for instance, as an authority champion and avid user of other transactions, is heavily reliant on this authority for its market access. Contracting leadership estimated that DARPA awarded hundreds of other transactions since obtaining statutory authority.

4. Support within the Government

On the opposite end of the scale from DARPA and SOCOM lies large-scale fielding and equipping of standardized items for the U.S. Army. Procuring millions of rifles, pistols, or helmets requires the use of a traditional contracting process, with its series of reviews and approvals. Needless to say, the traditional contracting process is longer and more bureaucratic than non-traditional methods.

“Effectiveness of expedited acquisitions fall on the support from [Contracting Officer’s Representatives] and the PMs to make them happen effectively” (KO at SOCOM, personal communication, August 3, 2016). “Sometimes the commercial items do not meet all the user’s needs; we tell them that 70 percent is all we can get, and they say that 70 percent is better than zero percent” (PM at PEO Soldier, personal communication, August 3, 2016). Support for non-traditional tools within an agency depends on its mission, culture, and market access needs. When presented with a partial solution, the customer may simply elect to rely on readily available technology and product offerings to meet the immediate requirements. Proposals of existing products with partial solutions afford a faster acquisition, fielding and equipping process than prototypes or developmental products with a prospect of comprehensive solution but uncertainty in the areas of cost, schedule or performance.

In the trade-off between accepting a quick partial solution or seeking a comprehensive solution, procuring offices are commonly inclined to compromise on a partial solution given immediate availability and greater price certainty. Acquisition community philosophy leans toward optimizing use and application based on existing solutions rather than optimizing solutions themselves. It is in this uncertain area of improving solutions that OTs offer greater reach at the market.

For an agency to seek other transaction authority, its mission must fundamentally hinge on advancing research or technology acquisition beyond existing commercial or defense solutions. Much of our energy, even when constrained by procurement tools, is focused on how to best or most closely meet acquisition objectives with existing tools, rather than pushing procurement tools boundaries. The perception of risk mitigation provided by conservative procurement methods serves as a deterrent from deviating outside these predictably safe and established methods.

5. Intellectual Property Rights: Collection vs. Protection

While the private sector is taking the lead in innovation, the government trails behind in adapting an intellectual property (IP) strategy for this new privately-funded order of conducting research efforts. IP and data rights terms and conditions vary based

on funding sources and parties' rights in using technology beyond a given acquisition. Industry conducts comparisons of opportunity costs, profit margins, risk levels and expected outcomes as standard business procedures. For those companies, the trade-off is between government revenues and other potential commercial revenues (profits) foregone at the expense of giving up property rights. The DOD carries the burden of avoiding even the perception of unprofitable IP dilution to establish its attractiveness as a buyer. Historic reliance on a traditional industrial base that is well-versed in defense acquisitions, internal development, and government-funded research made the DOD accustomed to retaining a high level of data rights. Such expectations are incompatible with venture capital-funded research and technology development efforts. And while domestic firms recognize the need for the DOD to maintain technological advantage, they must also maximize their market opportunities and potential for returns on investment. "We don't go after the data rights; we buy the product as is" (PM at PEO Soldier, personal communication, August 3, 2016).

According to DARPA contracts leadership, the agency historically dealt with many Silicon Valley companies of all sizes with a notable exception of the two largest companies—Google and Apple. While other technology companies do business with DARPA, concerns over IP permeate the entire process and interaction. As a matter of competition and growth strategy, large companies, in both defense and technology industries, monitor the market for new technology development at smaller firms. That technology, or the entire firm, then become a prime acquisition target to leverage new technology as stand-alone item or incorporate it into other systems with commercial or defense applications.

In discussing the rights to IP, we have identified a vast gap in perceived, or perhaps real, interpretation of the IP rights spectrum. DARPA contracting leadership described vendors' perception as driven by paranoia and distrust of the government. DIUx contracting leadership offers a cooperative approach to negotiating data rights, leaving all options on the table as a matter of attracting the widest pool of vendors and alleviating their concerns.

Justifiably, proprietary technology is the lifeblood of technology companies. So they want a lot of flexibility with retaining control over trade secrets and patent rights. DARPA considers its future needs in determining the extent of government IP rights to pursue. The dilemma the government and vendors run into is that, while vendors welcome government funding and the government is willing to fund promising development, vendors claim the need for both government and commercial markets to recoup their investment. One avenue DARPA considers is giving the job to a company, but delaying government claim to data rights. Part of market research and negotiation is having a good business sense to figure out what return on investment vendors need.

DARPA conducted hundreds of other transactions over the years, including some with companies in Silicon Valley. And it continues to seek smaller companies for future transactions. The hardest part is reaching them. The ballistic protection office at PEO Soldier offered an economic perspective on the attractiveness of the government market, including data rights: “[The government needs] to make sure the companies make money for them to be interested.” And if the government wants a company to develop a government-specific product, they may decline if the market is too small.

It’s really challenging. So for body armor protection and helmets, it’s a very small market compared to smartphones, automobiles, or aerospace. It’s a very small market for [force] protection. That’s why a lot of people and businesses are not interested. We don’t have large companies working in this area, only small companies. It’s not something you can help. Large companies look at that market and say: “No, we are not interested. Every month, the maximum is only a couple of million dollars in sales. We don’t need that.” (PM at PEO Soldier, personal communication, August 11, 2016)

When the government buys small lots, it does not appeal to the wider market, “But if you are talking about new small companies, then they should be interested. I don’t think the government is pushing any new company away.” The reservations are on the company’s side—they are “not interested.” The ballistic protection office even expressed skepticism of market capability:

We have all these companies coming in. Most of these companies think they have something better—they don’t. It’s the reverse—it’s not that they have something better that we don’t want to use. They don’t always

understand what we really want. Everybody thinks they have something better than the military. They come here to this office, we tell them the performance requirement, and ask: Can you make it? The answer is typically: “No.” (PM at PEO Soldier, personal communication, August 11, 2016)

For the relatively few companies that develop, or are capable of producing innovative technology, they may have the option to offer it to the wider market, including foreign governments and commercial markets. In such a competitive environment, the DOD needs to act as a competitive buyer. But this is a difficult feat. The ballistic protection office noted

It’s similar to trying to hire someone smart. You have to pay them more than other organizations to hire them and to retain them. If you tell a company with new technology that everyone wants: “Make this only for the military,” there is no way—unless you’re willing to pay much more. You look at their prospective target market coverage and size. Can you pay them [enough in profit to substitute other market opportunities]? You can’t. It’s taxpayers’ money. So it’s money driven. (PM at PEO Soldier, personal communication, August 11, 2016)

E. DEFENSE INNOVATION UNIT EXPERIMENTAL

As overseas conflicts, or the scale of U.S. participation in overseas conflicts, declines, the conflict-driven or life-saving urgency for rapid acquisition also diminishes. Extraordinary or temporary rapid acquisition authorities expire due to lack of justification, absence of request, and/or lack of congressional support to bend traditional processes during peacetime. Dr. Carter returned to the Pentagon as Secretary of Defense in 2015 when the DOD was still at war on multiple fronts, but on a smaller scale than in previous years. Secretary Carter realized that technology advancement and application was an item of immediate importance. He displayed the commitment to acquiring the latest technology for defense purposes with regular visits to Silicon Valley. In 2015, Secretary Carter announced the formation of Defense Innovation Unit Experimental (DIUx), with a mission to serve as a bridge between the U.S. military and companies operating at the cutting edge of technology (“Work with Us,” n.d.).

Military services and other government agencies previously reached out to the engineering community in Silicon Valley for innovative solutions. Secretary Carter made

a more deliberate and organized call to the technology development community by locating DIUx in the heart of Silicon Valley, just outside Moffett Federal Airfield in Mountain View, CA. DIUx started with a promising outreach mission to the technology community in Silicon Valley and expected strong interest and collaboration from the military community.

The success of the DIUx venture rests on, among other things, contracting flexibility and full utilization of expedited procurement methods. Any shortcomings in this combination can doom defense procurement of emerging technology and engineering talent. Unlike generic, commercial, off-the-shelf items, emerging technology has no substitutes. And unlike non-commercial defense-specific items, engineering talent behind emerging technology enjoys high demand from private industry buyers—the DOD’s competition in technology acquisition. In this niche sector of emerging technology, the DOD simply cannot employ its traditional and burdensome procurement process. In the area of emerging technology, the DOD risks losing opportunities to procure emerging technology altogether, thus jeopardizing its ability to maintain the technological advantage required to support the national defense strategy.

Importantly, DIUx opened its office without organic contracting capability. Instead, DIUx planned for contract execution through the respective customer organizations and requiring activities within DOD. Initially, DIUx relied on the Army’s System of Systems Security (SOSSEC) Consortium established by the Army Contracting Command, Picatinny Arsenal, NJ (ACC-NJ). The SOSSEC vehicle allows for OT awards.

Over time, DIUx concluded that organic, non-traditional procurement capability is necessary for its operations. Given the slow government hiring process and time-consuming training required for government procurement proficiency, a government internal transfer seemed the most reliable staffing solution. But even an internal transfer can take months, or even a year, to accomplish, assuming availability of qualified people willing to move to DIUx. Non-traditional defense contract writing capability, most notably OTA expertise, resides with ACC-NJ. To quickly enable DIUx to make purchases, they needed an immediate on-boarding of skilled OTA contracting officers. In

the summer of 2016, DIUx sponsored ACC-NJ contracting officers for a temporary assignment at its Silicon Valley office in conjunction with CSO call for industry submissions. DIUx intends to hire internal OTA contracting staff in the future.

While Silicon Valley is the leading technology innovation area in the country and the world, it is not the only technology hub. To cast a wider net, DIUx plans to expand to other technology hubs in Boston, Seattle, and Austin. Secretary Carter elevated DIUx profile and expectations by reorganizing it into a direct report organization—just as Secretary Gates did with the MRAP program years ago. As a new organization staffed with authorizations borrowed from military department headquarters, DIUx experienced a shortage of corporate expertise in leveraging existing non-traditional procurement methods. As DIUx grows in staff and experience, it may encounter other constraints similar to the more established rapid acquisition offices (i.e., DARPA and SOCOM).

The DIUx model relies on expedited contracting methods to partner with non-traditional suppliers. Flexibility and expert-level use of expedited procurement methods are key to the unit's success. DIUx has been evolving since its inception, improving its strategy, outreach, and effectiveness, to enhance the DOD's buying position in the competitive emerging technology market.

F. SUMMARY

This research collated feedback from various defense agencies with policy analysis of existing traditional and non-traditional procurement tools. The feedback from the acquisition community revealed that we need to view the market strategically, from the lenses of profitability, market size, and market limitations related to IP rights. We started this research with a basic premise of using the full arsenal of procurement tools to the DOD's advantage in the competitive market for new technology. Our research has shown that non-traditional tools such as other transactions afford wide flexibility, however no tool can meet all scenarios. Indeed, identifying the most appropriate tool requires an analysis of the stage and scale of the requirement. Available procurement authorities and flexibilities vested within the buying agency may further restrict applicable options.

V. DISCUSSION OF RESULTS, RECOMMENDATIONS, AND AREAS FOR FURTHER RESEARCH

A. INTRODUCTION

The government's current buying power still appears strong in the market; however, capitalizing on it requires educating both industry and defense acquisition community on the expedited contracting methods. We recommend increasing awareness of and training on these expedited contracting the methods, seeking out tactical authority at the DOD level, allowing more flexibility with the government, educating acquisition partners to gain support, and finally, pursuing the minimal necessary intellectual property rights for emerging technologies.

B. STRATEGIC ANALYSIS

The underlying conclusion of our research is that the government needs to think strategically and empathetically in acquisition of emerging technology. The DOD is inclined to expect that the marketplace has what it needs, or is at least willing to develop it. Taking a step back requires considering how businesses and market segments view the government as a buying organization. The government's purchasing role and magnitude varies by vendor and market segment. Some vendors rely predominantly or almost entirely on government sales. For those vendors, absent new markets, their continued existence critically depends on continued government orders. For other vendors, government sales may represent only a negligible share of revenue. Low portion of government sales offers those vendors a wider discretion in future pursuits of government sales. The government tends to impose regulations, clauses, and its own methodology on the market with limited regard for administrative burdens to vendors and the impact on government's competitiveness as a buyer. Some of the government's methods deter firms from actively pursuing government contracts, or may even cause them to avoid government contracts altogether.

These market realities raise the question of how to entice technology companies to pursue government sales and develop products for government and dual use. The long-

term government acquisition strategy for emerging technology should aim to shift the market dynamics toward an environment where innovative firms view the government as a favorably buyer and create products with the government as the intended customer. Ideally, even business creation and venture funding should include prospective government sales as part of technology companies' business plans from inception.

When choosing markets to pursue and products to develop, companies consider market size, potential, profit margins, development costs, and competition. Similarly, the government needs to consider its size as a buyer for a given product and how it affects the supplier's sales portfolio. Strategically, the DOD, and particularly DIUx, is trying to become a competitive and cost-effective buyer in the marketplace, especially in crowded and critical market segments like emerging technology. Competing buyers—private firms and foreign buyers—also carry advantages and disadvantages.

To better understand the participants and dynamics of this market, we gathered characteristic elements of the government (Figure 5), other competing buyers (Figure 6) and technology firms offering emerging technology (Figure 7). Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis allows for scrutiny of a market participant or homogenous groups of participants. The series of SWOT analyses then allows for strategic comparison of market participants. In the government category, our focus lies with the DOD. For competing buyers, we considered the strongest prospects. Due to limited sources and offerings of emerging technology, only the most competitive and attractive buyers will acquire the technology. For developers of emerging technology, we narrowed the analysis to the relatively few promising and successful firms in a wide R&D market where success is elusive. Those limited sources of emerging technology, similar to the strongest buyers, enjoy bargaining power and leverage well above industry average. The comparison of the DOD's analysis against other buyers reveals some commonality and deep differences in philosophy. After accounting for technology firms' motivations and pursuits, the DOD needs a strategy to leverage its strengths and opportunities to meet companies' objectives better than competing buyers. Such strategy demands much more than inward-looking plans for incremental streamlining of the defense acquisition process.

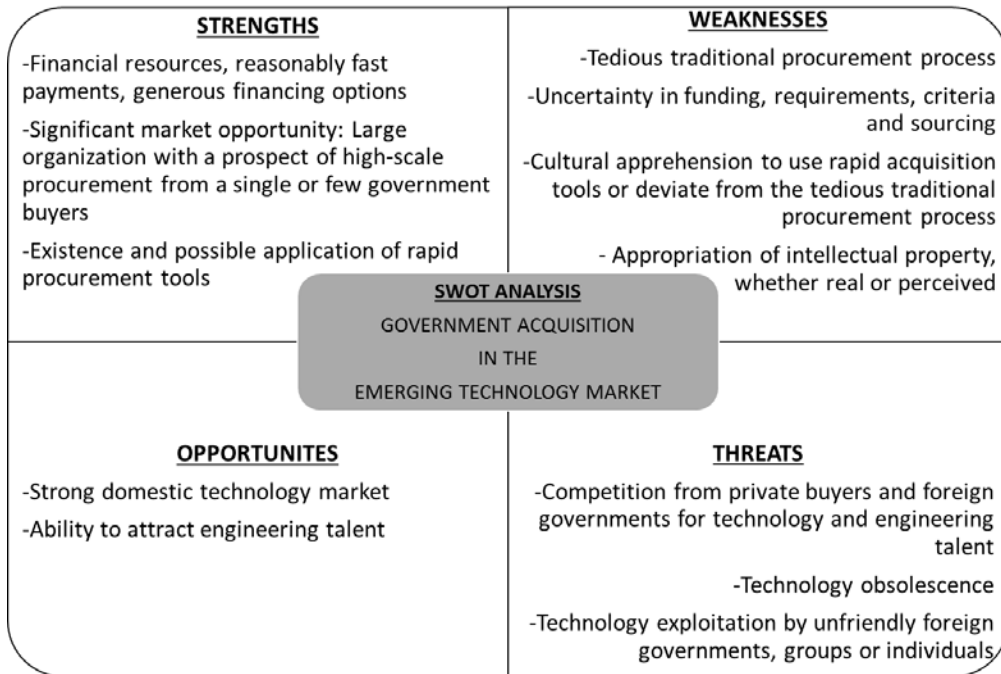


Figure 5. SWOT Analysis: Government Acquisition in the Emerging Technology Market

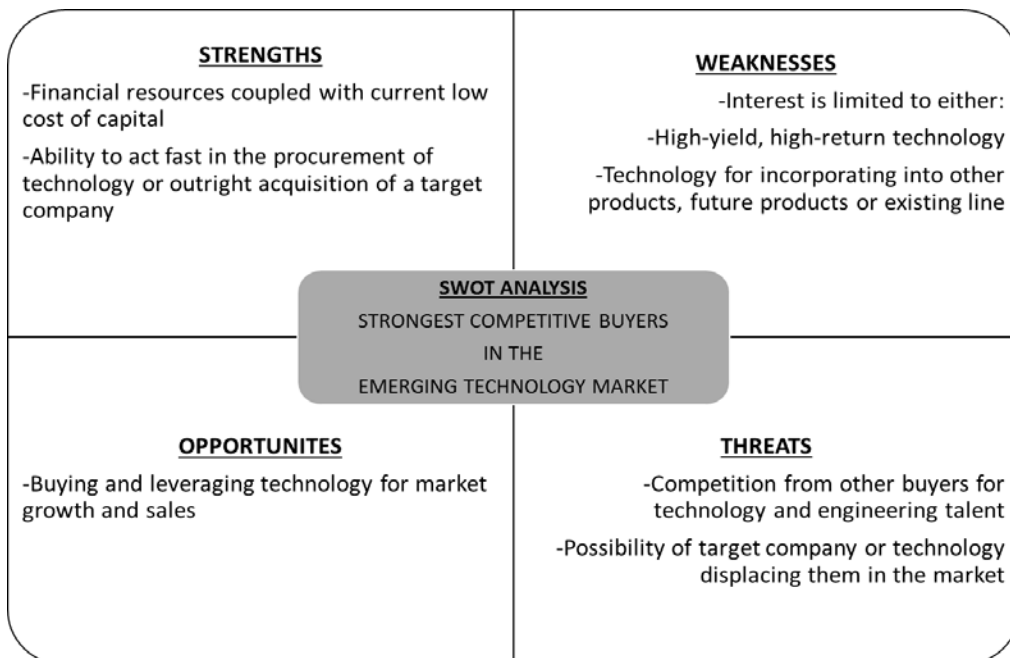


Figure 6. SWOT Analysis: Strongest Competitive Buyers in the Emerging Technology Market

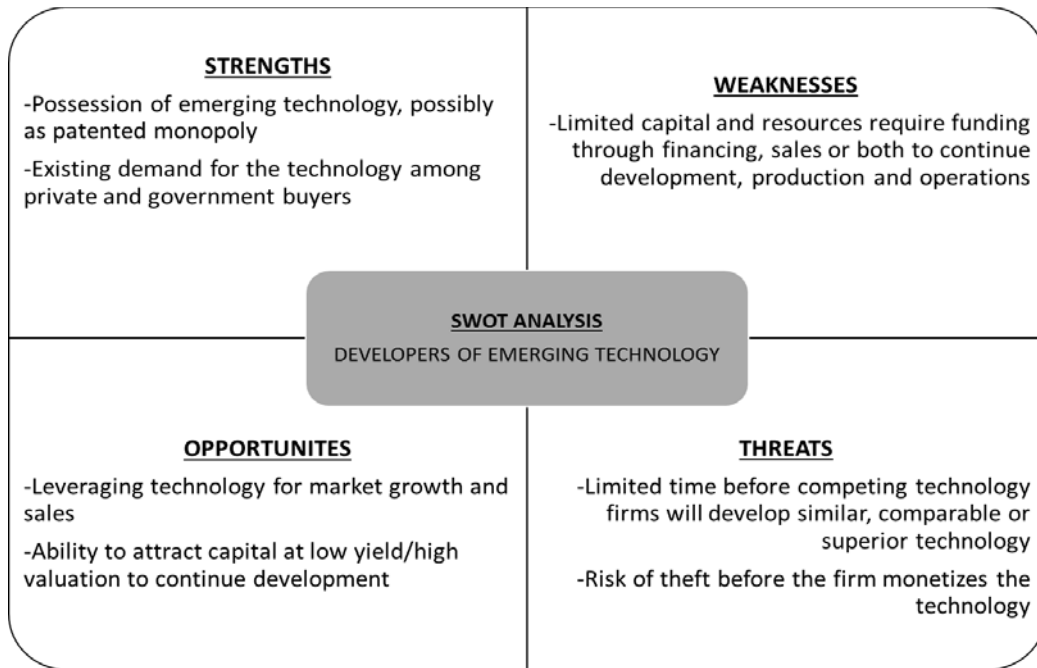


Figure 7. SWOT Analysis: Developers of Emerging Technology

This basic analysis shows that a buyer's success depends on leveraging relative strengths and mitigating relative weaknesses to prevail in the market. The SWOT elements involve organizational culture, financial standing, risk tolerance and mission objectives. Procurement method is only one of the acquisition policy tools in this endeavor, although it is most direct and immediate in interacting with the industry. It acts as a vehicle of exchange with vendors conveying everything from financial consideration to organizational priorities.

C. DISCUSSION OF RESULTS AND RECOMMENDATIONS

Government agencies like DARPA and SOCOM have been successfully executing expedited contracting methods for research and prototypes for decades. As discussed in Chapter IV, there are five improvement areas that will enable government agencies to meet their emerging technology needs. We conclude that the following initiatives will aide in effective application of expedited contracting methods to further attract non-traditional vendors in collaborating with the government.

1. Awareness of Expedited Solicitation/Contracting Methods and Training of the Users

If you were to ask junior contracting officers/administrators how they can quickly acquire R&D, prototypes, or other technologies without using the FAR, you would likely get a blank stare. Prior to conducting our own research on the topic, neither one of us ever worked on, or had knowledge of expedited contracting procedures. To that point, if you have never worked for DARPA, SOCOM, or another cutting edge technology user, chances are that you have never heard of expedited contracting procedures, either. Our research suggests the government could greatly benefit from awareness training, or formal training, on these much quicker methods of contracting. We recommend that the DAU create a web-based training for the multiple types of expedited contracting methods available to the user. We also recommend that such a course be a requirement for achieving Acquisition Professional Development Program (APDP) Level III certification. The partnership that DIUx and the broader government seeks with the emerging technology engineering community requires informed parties, well-versed in expedited methods.

2. Authority to Use

Currently, only certain agencies have the authority (granted by Congress) to execute OTAs (see Chapter IV, Table 1). This authority provides the latitude to work outside of the FAR's more traditional contracting methods. We recommend delegating congressional authority for OTAs to the Assistant Secretary of Defense (Research & Engineering) to determine which DOD agencies may execute OTAs. In the absence of relevant authority to use OTAs, or other non-traditional methods, procurement offices operate within the constraints of traditional methods. Those traditional methods may then entice a limited pool of vendors with existing but partial solutions and exclude the more innovative vendors with prototypes or developmental solutions. In this predicament, procurement offices default to navigating the limited avenues of traditional contracting rather than widening the available path to success. The advocacy for using non-traditional methods should come from executive levels. Training, awareness, and cultural acceptance of non-traditional tools hinge on existing authority to execute them.

3. Flexibility of Options

In the Air Force, it has long been said that flexibility is the key to airpower. While we are not focused on actual airpower in this research, flexibility is key to successful contracting for emerging technology. While many contracting officers will argue that they can only work within the confines of the FAR, the FAR itself conveys that

the role of each member of the Acquisition Team is to exercise personal initiative and sound business judgment in providing the best value product or service to meet the customer's needs [and] Government members of the Acquisition Team may assume if a specific strategy, practice, policy or procedure is in the best interests of the Government and is not addressed in the FAR, nor prohibited by law (statute or case law), Executive order or other regulation, that the strategy, practice, policy or procedure is a permissible exercise of authority. (FAR 1.102(d), 2016)

The FAR provides the flexibility for the contracting community to step out of comfort zones, where appropriate. We recommend that no policy or other restrictive directives be produced to limit this flexibility, particularly in acquiring emerging technologies.

4. Support within the Government

Support for the expedited procurement processes and methods, such as other transactions, is needed by all facets of the execution chain, from Congress to Judge Advocate General (JAG), all the way down to the contracting officers, CORs and PMs. Lacking direct guidance and public law direction, knowledge of how we apply the expedited contracting solutions is key to gaining organizational support. We recommend training for acquisition professionals and partners, including JAG, financial managers, PMs, and system engineers so they can better understand the process of the expedited contracting methods.

5. Intellectual Property Rights: Collection vs. Protection

In an effort to attract and gain the support of non-traditional vendors, it is extremely important that the government only negotiate for the IP rights it absolutely needs to execute its missions. As the IP strategy guidance directs, "Don't make an

unnecessary ‘grab’ for deliverables or additional license rights for proprietary IP” (DOD Open Systems Architecture, 2014, p. 3). We recommend agencies reduce their need for proprietary IP rights and seek only what is needed to satisfy mission requirements.

6. R&D Funding Sources and IP Implications

While the overall R&D spending in the U.S. continues to grow (see Figure 8), federal R&D spending has been decreasing after it peaked in 2010 (“Historical Trends,” 2016). Since then, federal R&D spending, as both a constant-dollar amount and share of overall funding, has been on a steady decline. Industry and other funding sources have more than offset the decrease in federal spending, leading to the overall R&D spending increase.

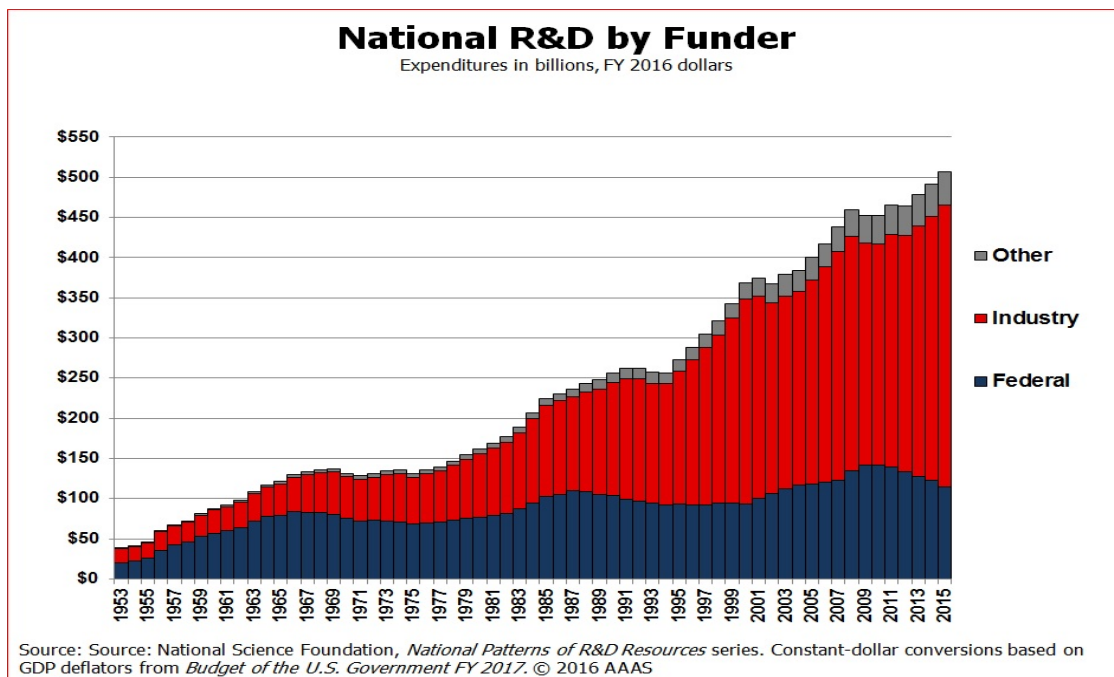


Figure 8. Cumulative R&D Expenditures by Funder.
Source: “Historical Trends” (2016).

This funding reliance shift from federal to other R&D funding sources goes back several decades. As part of a long-term trend, other R&D funding sources outpaced federal R&D spending back in the 1970s (see Figure 9). Strong growth in industry and

other R&D spending compared to relatively flat federal funding now leaves federal R&D funding share at less than a quarter of the overall R&D funding—a far cry from the 1960s when federal R&D spending share peaked at about two thirds of the overall R&D funding (“Historical Trends,” 2016).

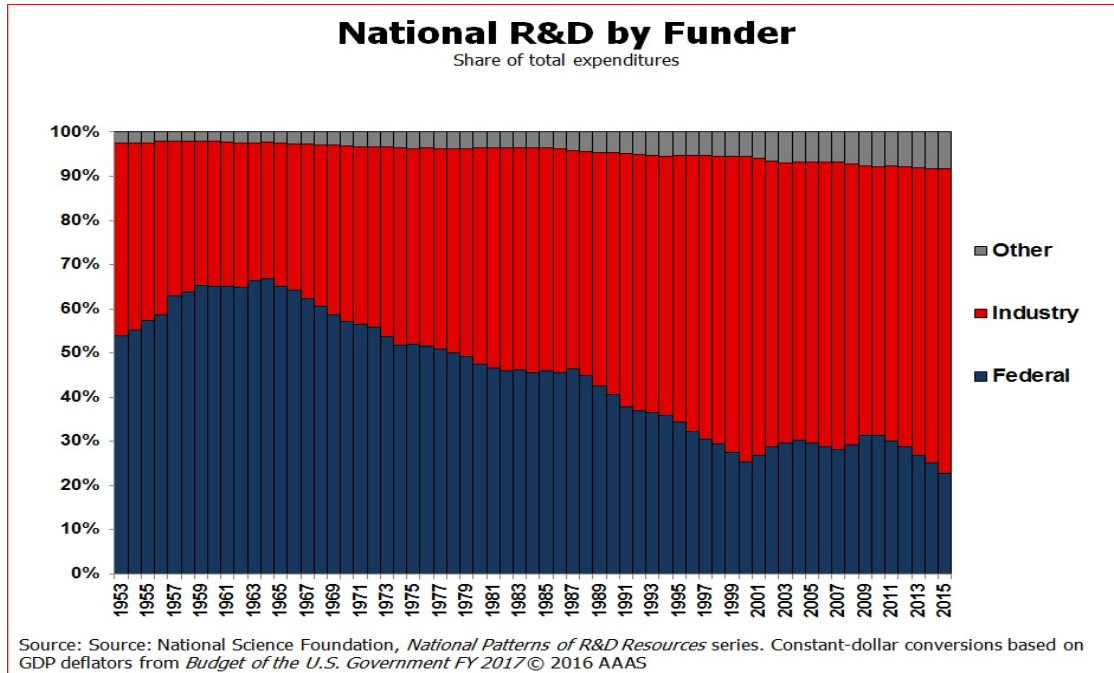


Figure 9. Allocation Ratio of R&D Expenditures by Funder.
Source: “Historical Trends” (2016).

This is no indication that this trend of decreasing federal share of R&D spending will change. Nor is it intrinsically disadvantageous to the U.S. economy and government. However, this phenomenon does call for an adaptation in technology acquisition. Private funders need to deliver attractive returns to investors both as part of the arrangement for existing funding and to encourage future investment. R&D in the U.S. has become predominantly dependent on private funding. The government has neither the inclination nor the means to replace private R&D funding dominance. Private R&D funding certainly offers the government an advantage of having sources other than appropriated budget to fund domestic R&D. It affords the government more flexibility in how much to fund R&D and where to target efforts that may be underfunded through private sources.

With federal sources taking a secondary role in overall R&D funding, the defense acquisition posture needs to acknowledge commercial lead and dominance. Post-development, the contractual relationship with regard to IP between vendors and the government rests with terms, conditions, and IP clauses. The government philosophy on IP policy and clauses lags behind, and is essentially from the era when the government dominated R&D funding and was entitled to respectively higher levels of IP rights. And while the government continues to heavily fund defense-specific R&D, this sector is shrinking to a niche segment compared to the growing technology market. Thus, legacy IP policy serves as a poor policy for the current state of privately-funded emerging technology.

The U.S. government's buying share in the defense market is largely inverse to its share in the technology market. Since U.S. defense spending far exceeds other countries' budgets, or even combinations of budgets, the DOD retains enough leverage to both attract traditional defense suppliers and also to limit authorization to sell equipment, systems and sensitive technologies to other countries. In emerging technology, the DOD lacks comparable market buyer dominance. Notwithstanding the administrative burdens of the traditional defense acquisition processes, other buying segments offer more lucrative opportunities to technology vendors. In this environment, attempting to exclude other markets with an us-or-them attitude is a losing proposition for the government. An effective way to entice technology sector cooperation is not by excluding their other lucrative markets, but by expanding them. Adding government purchases to vendors' prospective and target markets favorably grows market opportunity and interest for vendors. This, however, requires the government to adapt to the industry's products, processes, and legal terms. The government may still need product modification to meet its needs, however these modifications should be limited, and only undertaken when the additional value outweighs the additional costs.

The acquisition process—traditional for industry and non-traditional for the DOD—is a non-price government lever to enhance itself as a favorable buyer. The legal terms should still deliver sufficient security and performance assurance to the government, without unduly hindering vendors' market opportunities. The security and

protection policies, while well-intended, relevant, and necessary, do not alone account for the economic reality of market sizes and profit margins. In a profit-maximizing environment, restrictive IP policy excludes buying opportunities for the U.S. government, rather than other buyers. Recent Better Buying Power (BBP) initiatives attempt to reconcile with this reality by encouraging flexibility in IP terms. However, the government needs to distinguish among its varying strategic positions in different markets and adapt its IP pursuits accordingly. While the government can successfully impose a restrictive IP policy with tank purchases where it acts as the sole buyer, such policy will only alienate it from the emerging technology market.

The best bet for the government is to incentivize companies to enter defense products market and pursue government solutions by growing their markets with dual commercial and military applications. The dual market should be not an afterthought once technology has already been developed; it should be a mindset and methodology from the formation of businesses and the inception of technologies.

BBP does not alter the regulatory guidance, but influences government acquisition philosophy, i.e., with the expanded use of incentive contracts. Similarly, BBP has the potential to encourage the DOD to exercise the flexibility within existing IP policy to better attract technology companies. Previous iterations of BBP encouraged increased use of prototyping and experimentation, modular open systems architecture, and other transactions. BBP has so far provided reference material on intellectual property terms and directed internal review and assessment of trends. The next step is to raise awareness and encourage the requiring and procuring organizations to seek lower levels of IP rights when purchasing technology funded primarily, or entirely, at private expense with prospective commercial application and competing buyers in the wider market.

D. SUMMARY

Acquisition organizations in the DOD and the broader government typically operate on the premise that they can unilaterally set the terms of market exchange with the assumption of the market's willingness to abide by such rules, the market's ability to

provide the required products, and market's willingness to actually attempt to provide the products to the government instead of pursuing other opportunities. The government continuously attempts acquisition reform and modernization initiatives. While those attempts are well-intended, they often have fallen short of the stated goals and policy objectives. Furthermore, acquisition reform initiatives typically offer a limited inward-looking scope for government agencies. Such efforts to, for example, shorten the procurement administrative lead time (PALT), consider government goals and preferences. They seldom compare PALT with market standards and how fast government procurement needs to be accelerated to become competitive with the broader market.

With regard to competition, the government is understandably focused on competition among its suppliers. The deeper question is how to broaden the existence of suppliers in the products of government interest and how to raise the government's market participation among the businesses in those respective segments. Competition works both ways. The government focuses on competition among suppliers with little consideration for its competing buyers. Competing buyers vary by products, services, location, and time; creating a dynamic environment. Besides buyers outside the government, the government also falls into the trap of competition among various government agencies and procurement offices for limited products and suppliers.

Contracting methods offer useful tools in navigating toward procurement and policy objectives. But contracting methods are only one set of tools in the broader acquisition environment. Flexible contracting tools have the potential to attract additional suppliers and broader market segments than afforded through traditional methods alone. Having a broad, market-wide acquisition reform strategy affords the government a better chance not only of conducting procurement as intended, but also of having access to more products, suppliers, and market segments.

Regulations, policies, and procedures may offer a degree of assurance in the procurement process and public policy implementation. But they also come at a cost. The costs come in the form of higher costs to suppliers that pass along the costs back to the buyers (i.e., the government) in the form of higher prices. Higher cost to enter and

conduct business results in fewer suppliers, a less competitive segment, higher profit margins to fewer suppliers, and higher prices to the government. New and small businesses are especially sensitive to costs of entry and administrative compliance overhead. For most businesses, establishing business systems comparable to those at the largest defense contractors is not an option. While patents, data rights, capital intensity, and other outside factors limit new entrants and competition, the government further limits the supplier pool with administrative burdens already established at existing suppliers but prohibitively costly and inconvenient to prospective suppliers. Meanwhile, the benefits of administrative burdens are uncertain. Thus, the traditional approach carries the risk of levying administrative costs without adequate accompanying benefits.

The existing non-traditional methods afford government buyers wide flexibility in procurement. The challenge lies in matching available tools with relevant requirements. Culturally, the acquisition community needs to embrace the available tools as opportunities, while being selective with procurement methods and adaptive to the market environment. No single procurement method, or IP approach, efficiently captures all acquisition scenarios. Just as procuring offices attempt to apply a relevant contract type to a specific procurement, we also need match the procurement with applicable method and IP strategy.

E. AREAS FOR FURTHER RESEARCH

This research project highlighted the need for the U.S. government to acquire emerging technology to retain its dominance over adversaries. We emphasized how lengthy and burdensome processes associated with traditional contracting methods inhibit the government from being a “good” or “sought after” customer in the eyes of emerging technology vendors. Further, we discussed how available expedited methods could improve this relationship, but only when we have the authority to use them. New questions arose during the course of this research that we believe future studies should address:

1. Do technology firms still perceive that government contracting is too burdensome? If so, in what ways?

2. Should DAU include expedited contracting procedures as part of APDP Level III certification? If so, how?
3. Should the FAR include expedited contracting procedures in FAR 16, or would their inclusion cause unnecessary regulation to an inherently flexible system of contracting?
4. How can we incentivize established defense industrial companies to become more innovative?
5. Could expedited contracting methods replace traditional methods for acquisitions beyond emerging technologies? If so, which ones?

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APPENDIX A. COMPARISON OF EXPEDITED METHODS

Goal	Rapid Technology Prototyping	Staged Contracts	Milestone- Based Competitions	Incentive Prizes	Challenge Based Acquisitions
Business Participation					
Attract innovative small businesses	✓	✓	✓	✓	✓
Attract businesses or organization new to government contracting	✓	✓	✓	✓	✓
Mission Requirements					
Develop complex, incremental systems					
Develop discrete areas or modules for complex, incremental systems	✓	✓	✓	✓	✓
Determine if there are any solutions to a known problem	✓	✓	✓	✓	✓
Make testing less expensive	✓	✓	✓	✓	✓
Encourage industry investment first				✓	✓
Obtain a concept paper before buying a prototype		✓			
Provide for follow-on contracting for production			✓		
Obtain short proposals (less than 10 pages) or prototypes	✓	✓		✓	✓
Use special authority outside the FAR for competition				✓	
Prototype Requirements					
Test pre-existing prototypes before buying		✓		✓	✓
Build low cost prototype	✓			✓	
Test prototypes in relevant demonstration scenario	✓	✓	✓	✓	✓
Solicitation Type					
Use a standard solicitation such as an RFP for a well-defined, multi-component problem		✓	✓		✓
Use an R&D type solicitation such as a BAA to provide objectives but not specifications	✓	✓	✓	✓	✓
Funding Type					
Use firm fixed type pricing funding	✓	✓	✓	✓	✓
Utilize milestone based payments		✓	✓	✓	✓

Goal	Rapid Technology Prototyping	Staged Contracts	Milestone-Based Competitions	Incentive Prizes	Challenge Based Acquisitions
Program Office					
Attract innovative small businesses	✓	✓	✓	✓	✓
Attract businesses new to contracting	✓	✓	✓	✓	✓
Develop complex, incremental systems					
Develop discrete modules for complex, incremental systems	✓	✓	✓	✓	✓
Determine if there are solutions to a known problem	✓	✓	✓	✓	✓
Make testing less expensive	✓	✓	✓	✓	✓
Encourage industry investment first				✓	✓
Obtain a concept paper before buying a prototype		✓			
Obtain short proposals (<10 pages) or prototypes	✓	✓		✓	✓
Test pre-existing prototypes before buying		✓		✓	✓
Build low cost prototype	✓			✓	
Test prototypes in relevant demonstration scenario	✓	✓	✓	✓	✓
Procurement Office					
Use a standard solicitation such as an RFP for a well-defined, multi-component problem		✓	✓		✓
Use an R&D type solicitation such as a BAA to provide objectives but not specifications	✓	✓	✓	✓	✓
Provide for follow-on contracting for production			✓		
Use firm fixed type pricing funding	✓	✓	✓	✓	✓
Utilize milestone based payments		✓	✓	✓	✓
Legal					
Use special authority outside the FAR				✓	
Use FAR authority	✓	✓	✓		✓

Source: White House Office of Science and Technology Policy (OSTP) (2014).

APPENDIX B. SAMPLE VENDOR LOAN AGREEMENT

1. It is known that acceptance for test, loan, or evaluation for potential use by the Government does not make a promise to pay, a recognition of novelty, originality, uniqueness, or a contractual relationship which would make the Government liable to pay for any use of information to which it would otherwise be entitled. The Government has no plan of using any article or disclosure in which the submitter has set up property rights, without compensation.
2. The Government will use care in the handling and testing of submissions. The Government will not take responsibility of liability to submitters or others for:
 - a. Damage to, destruction, or loss of submissions resulting from testing or otherwise.
 - b. Damage or injuries due to negligence or otherwise, which are incurred or suffered by submitters, submitter's employees, or invitees during any test of such article or disclosure which is under the control of the submitter, submitter's agents or employees.
3. The submitter agrees to indemnify and hold harmless the Government, its agents, and employees from any and all claims or causes of action whatsoever as may be incident to or come from the Government's acceptance of and its part in the test and evaluation of any article covered by this agreement.
4. The manufacture, transportation, and maintenance of articles submitted to the Government for demonstration or testing will be done at no cost to the Government.
5. The submitter of any articles for evaluation will give instructions to the Government for disposal of such articles prior to completion of the test or evaluation. The disposal shall be at the cost of the submitter.
6. The testing or evaluation of such articles will in no way cause the Government to acquire the articles submitted.
7. The articles submitted will be handled according to Government rules for safeguarding such articles from unauthorized disclosure. The submitter agrees that any liability of unauthorized disclosure by the Government will not go past the actual loss of the submitter caused by acts of the Government.
8. The acceptance of articles for demonstration, testing, or evaluation is not to be construed in any way as an acceptance or offer to accept such articles for Government use or as any promise implied that any contract to buy is to follow from the demonstration, test, or evaluation.

9. The terms of this Agreement shall be for the articles listed below, and also for all articles submitted hereafter until this agreement expires or is terminated in writing:

Please list MAKE, MODEL, and SERIAL NUMBER for each component...

10. The time of this Agreement shall be from _____ to _____ unless sooner terminated by either party. _____ may remove this equipment at any time after giving prior notice to the Contracting Officer so coordinated action can be taken for timely removal. In case of changed operation conditions, the Government may ask _____ to remove the equipment prior to expiration of the Agreement.

I, _____, certify that I have read this Agreement and will adhere to its terms and conditions. I further certify that I am () sole owner of all articles and disclosure submitted for demonstration, testing, or evaluation; () a membership of the partnership or association known as _____ and have full authority to bind the corporation. The address of the corporation is: _____.

(Signature/Date of Submitter)

(Typed Name)

(Address)

(Signature/Date of Contracting Officer)

Source: Defense Acquisition University (DAU). (2011, August 30)

APPENDIX C. INTERVIEW QUESTIONS

Questions are adapted from Senator Carper's letter to Office of Management and Budget (Carper, 2016).

1. What is the organization's process or flow chart with schedule estimates for rapid acquisitions (if available)? Does the organization apply any method to measure or evaluate success in using the current process(es) for rapid acquisition?
2. What techniques is the organization using to acquire innovative technology solutions developed by start-ups and other companies that have not traditionally done business with the government? What percentage of purchases come from businesses making first sale to the government?
3. What is the organization doing to ensure that contracting officers are knowledgeable and comfortable with the relevant use of acquisition tools we discussed, as well as any other ways of rapidly acquiring emerging technology?
4. What other methods are available to acquire new technology in a rapid manner? Has the organization considered these methods?

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