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**ORGANIZED FOR INNOVATION: AN EMPIRICAL
OBSERVATION OF INNOVATION ADOPTION WITHIN
DEFENSE ORGANIZATIONS**

June 2018

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INNOVATION ADOPTION WITHIN DEFENSE ORGANIZATIONS**

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Submitted in partial fulfillment of the
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ABSTRACT

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LIST OF ACRONYMS AND ABBREVIATIONS

DARPA	Defense Advanced Research Projects Agency
DIUx	Defense Innovation Unit Experimental
NASA	National Aeronautics and Space Administration
NDS	National Defense Strategy
OT	other transactions
OTA	other transactions authority

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I. INTRODUCTION

We will shed outdated management and acquisition practices, while *adopting* [emphasis added] American industries' best practices. Our management structure and processes are not engraved in stone. (Secretary of Defense, 2018, pp. 18–19)

This chapter introduces the topic of innovation adoption within Department of Defense (DoD) organizations. Specific attention is given to its applicability to the national defense strategy. Additionally, this chapter provides an overview of the purpose, methodology, and approach to analysis regarding the topic of innovation adoption within DoD organizations.

A. WHAT IS INNOVATION ADOPTION?

Innovation adoption is the process by which organizations integrate new ideas, concepts, methodologies, or technologies into their existing infrastructure.¹ This infrastructure includes people, processes, facilities, and technologies. While innovations within the military and those occurring within the commercial sector may differ on several points, many of the underlying dynamics related to the adoption of innovation are shared. Understanding the nature of innovation in both kinds of organizations require observation of the process by which innovation is adopted, to include the challenges associated with integrating and implementing the innovation within organizations.

1. Innovation Adoption within the Department of Defense

DoD organizations seeking to adopt and diffuse innovations usually require some degree of structural and organizational changes. Additionally, innovations by themselves often provide little operational value until they are properly embedded in organizational and managerial practices, which themselves often need changes resulting from the innovation. Such a co-evolutionary process is not without challenges, including various individual, organizational and bureaucratic barriers to change and inertias. Augier, Dew, & Aten (personal communication, April 2015) discuss the challenges of inertia while

¹ A definition is, for example, provided by Evans (2006).

attempting to adopt new practices within organizations. They argue that innovations are more successfully diffused when compatible with existing organizational values: “the relative advantage of an innovation, its simplicity (complexity), and its compatibility with established beliefs and preferences are the biggest predictors of how fast an innovation will diffuse in a population of individuals” (Augier et al., personal communication, April 2015).

2. Relevance to National Defense

The topic of innovation is also central to national defense. The 2018 National Defense Strategy (NDS) leverages the term to describe such concepts as, “technological innovation,” “business innovation,” “organized for innovation,” and the “National Security Innovation Base” (Department of Defense [DoD], 2018). The successful adoption and integration of commercial innovations is a major theme of the 2018 NDS, for several reasons, including the need to expand the defense industrial base; and to adopt best practices from industry leaders. Attempts to incorporate commercial methodologies, concepts, and innovation theories within military organizations presents unique challenges which are deeply embedded within the conduct of warfare and the nature of innovation itself. Thus, the complexities involving the integrating and adoption of commercial innovations within defense organizations is a relevant topic of research.

The ability of DoD organizations to adopt, innovate, and diffuse certain innovations has played a notable role in maintaining an advantageous national security posture for centuries (Murray, 1996; Millet, 1996, p. 1); and innovation at both tactical and strategic levels are important for military organizations to adopt. Although innovation by its very nature can be very hard to predict and plan in detail (Augier & Hughes, personal communication, April 10, 2018), managing innovations and the adoption of them within military organizations will have relevancy to the tactical-edge of warfighting as well as be reflected in DoD’s operating concept and business practices.² Marine Corps Doctrinal Publication 1 states, “Success depends in large part on the ability to adapt—to proactively shape changing events to our advantage as well as to react quickly to constantly changing

² Implementation of adapting to innovation is not new; for instance, MCDP 1 or FMFM 1 both emphasize this point.

conditions” (Department of the Navy [DoN], 1997). The 2018 NDS also addresses the need for modernization and change: “Modernization is not defined solely by hardware; it requires *change in the ways we organize* [emphasis added] and employ forces” (DoD, 2018).³ Hence, a challenge for both current and future military leaders will be integrating commercial innovations with (national security related) strategic ends; and further relating those ends to results across the domains of warfare.

B. PURPOSE

During the preparation of this thesis, I became increasingly aware of the complex array of challenges related to an organization’s capacity to adopt new ideas. For instance, integrating new ideas into existing organizations can tests one’s ability to careful esteem underlying values and acknowledge entrenched beliefs tightly held within the adopting institution. The innovator’s ability to account for existing organizational beliefs, values, and paradigms will influence their ability to effectively diffuse innovations over the long-term. Andrew Marshall offers time-tested wisdom regarding the integration of new ideas within organizations: “Developing and gaining acceptance for a new framework of strategic analysis will not be easy. Changing people’s minds, or ways of thinking about problems, takes time” (Marshall, cited in Augier et al., personal communication, April 2015).

This research is designed to extend the discussion regarding DoD’s integration of innovations at the organizational level. Although it is impossible to dispel or address all arguments concerning innovation and its adoption within military organizations in one thesis, I attempt to address key issues surrounding the process of adoption and the unique barriers to this process within DoD organizations. The purpose of this research is to provide insights to the following research question: How can the adoption of innovative concepts, methodologies, and technologies be better understood and leveraged within DoD organizations?

³ See DoD (2018) for further NDS guidance to more successfully integrate innovative concepts from commercial industry.

C. METHODOLOGY

In order to address this question, I use both academic / scholarly writings as well as empirical data / cases. An initial literature review will be used to identify key relevant literature surrounding the challenges of innovation adoption within organizations. The review will also present further opportunities and challenges unique to DoD organizations. Observations made during the literature review will then be synthesized in order to extract key themes among the literature.

D. APPROACH TO ANALYSIS

Opportunities to adopt innovations exist at each level of warfare and within the variety of supporting establishments. This thesis will take occasion to address the adoption of innovations specifically within organizations supporting the various warfighting functions. Detailed attention will be given to organizations which have attempted to adopt innovative business practices related to acquisition and procurement. The analysis provided within Chapter IV analyzes the adoption of other transactions authority (OTA) within specific DoD agencies. Finally, I will draw upon this analysis to discuss some lessons learned and further extend the discussion of DoD's integration of innovations at the organizational level.

E. SUMMARY

In summary, this chapter introduced the concept of innovation adoption and described the relevancy of innovation within the context of national defense. Additionally, this chapter outlined the purpose, methodology, and approach to analysis associated with this research. The following chapter will provide a review of literature surrounding the topic of innovation adoption within organizations.

II. LITERATURE REVIEW

Success no longer goes to the country that develops a new technology first, but rather to the one that better *integrates* [emphasis added] it and *adapts* [emphasis added] its way of fighting. (DOD, 2018)

The previous chapter introduced the topic of innovation adoption within the context of defense organizations. This chapter opens a broader discussion of the topic and reviews literature relevant to the opportunities and challenges relevant to the adoption of innovation within organizations. Finally, my intended contribution to literature will be discussed.

A. INNOVATION AND THE INDIVIDUAL

1. Innovative Leaders

Recognizing individual contributions to innovation is central to the discussion of innovation within organizations. Individuals exemplifying innovative leadership provide a starting place to discuss how innovation can be integrated into existing organizational paradigms. Examples abound within the DoD of individuals who introduced new concepts to the institution, including Victor Krulak; James Mattis; John Boyd; Al Gray, and others. Oftentimes, innovative shifts within organizational practices involve initial experimentations, but do not get embedded in the organization's way of thinking before key leaders push and develop the ideas. For instance, as was the case with the maneuver warfare movement within the Marine Corps:

For maneuver warfare to take its place as the Marine Corps' organizational principle, several organizational factors needed to be in place. Central to maneuver warfare's success was the role of Gray in pushing forward learning and experimentation, intellectual debate, reading and building loyalty in boot camp. (Augier & Guo, 2017, p. 142)

Although innovative leaders will ensure that needed changes are continuously driven within our armed services, military organizations do not only have to rely on recruiting innovative talent, but can also seek to harness innovative thinking and learning within the organization (Roberts & King, 1996; Osborne, 2005).

2. Training Innovators

The training and education of nation's military has been a major theme of research and discussion since the early militia of the American colonies. According to J. M. Palmer, the initial considerations for adequate development of a well-suited military points to the importance of both an organized and adequately trained militia (Palmer, 1941). Andreski (1968) argued that the development and sustainment of a nation's military is highly regulated through its ability to train and deploy its forces abroad:

If the skills necessary for a warrior can be acquired and kept only by protracted and continuous training, military service tends to become professionalized. Normal economic activities cannot be reconciled with continuous military training except in the case of primitive hunters...if the wars are waged in distant regions—distant, that is to say, in relation to the development of the means of communication—the professionalization of the army will be fostered. (p. 34)

Opportunities to think differently within military organizations usually begins within its training and education institutions. These institutions provide the basis for organizational learning as well as agreeable points of departure, when challenging the status quo is needed.⁴ Murray (1996) comments on the centrality of these institutions to innovative thinking during the interwar period:

One of the important components in successful innovation in the interwar period had to do with the ability of officers to use their imaginations in examining potential innovations. The atmosphere that institutions of professional military education fostered was central to developing such imaginative powers and thus to success in innovation. (Murray, 1996, pp. 317–318)

Educating future military leaders to better understand the nature of innovation (as well as to become innovative in their thinking) is essential for our military organizations to be able to continue to adapt in the future. Continuously integrating the topic of innovation within military education as well as recognizing those who lead with innovation may help improve its application within DoD organizations.

⁴ Institutions include not only service schools, to include the Naval Postgraduate School, but also institutes espousing rigorous professional military education such as Marine Corps University, Air Force University, and the U.S. Naval War College.

B. INNOVATION AND THE ORGANIZATION

While individuals “thinking differently” is an important place to start, Osborne (2005) discusses the importance of innovation residing within the fabric of the organization as opposed to individual innovativeness: “an over-emphasis on the individual to the exclusion of the organizational context risks the collapse of the innovation once that individual leaves the organization” (p. 171).

Transitioning from individually-held innovations to ones ready to be integrated requires leaders who maintain a genuine awareness of interpersonal and group dynamics as well as very good understanding of how their organizations work. Augier and Hughes discuss the leadership challenges associated with transitioning organizations from individual to collaborative and integrated innovation:

A problem arises when planners do not appreciate the necessary contribution of a few precious disruptive and innovative thinkers. But if innovators alone dominate, then there is no one to plan the development, implementation, and tactics to exploit an innovation, often in ways quite different from the original intent. Leaders must know how to recognize, nurture, and listen to innovative thinkers and suppress bureaucratic impediments to “thinking differently.” (Augier & Hughes, personal communication, April 10, 2018)

Bardach (2008) argues that innovation within government organizations involve long developmental process, distinguishable subprocesses, and feedback mechanisms. According to Bardach (2008), government organizations seeking to become more innovation should look to expand their innovative capacity over rewarding innovative individuals. She explains that focusing on organization capacity helps build corporate virtue over individual virtue: “capacity also has the opposite virtue of consolidating under one rubric rather than varied components, such as individuals’ psychological dispositions...it permits us to ‘give credit,’ so to speak, for collaborative success that may not look much like collaborative behavior on the surface, such as quarrels and threats that serve the purpose of clearing the air and preparing the way or more productive work” (Bardach, 2008, p. 122).

C. NUANCES OF DOD INNOVATION AT THE ORGANIZATIONAL LEVEL

An organization's environment and operational context will naturally influence the various decisions and behaviors affecting its means and rate of innovation adoption. Military institutions, in particular, face unique challenges which can be specifically attributed to its operational context and environment. This section of the literature review will describe this environment in relation to the organization's ability to adopt innovations.

1. Environments of Innovation: Commercial Markets and Battlefields

Soeters et al. (2010) distinguishes the military organization from other organizations which are directly influenced by commercial market dynamics:

they differ from most organizations that have to prove their existence everyday in a market where their supply needs to meet a demand...But in the military the relation between supply and demand is indirect at best. The lack of a direct market and price mechanism tends to make military people more preoccupied with operations than with costs. Aside from a highly appreciated concern for casualties among their own personnel, military leaders do not have a natural interest in organizational efficiency. If worst comes to worst, they are deliberately ignorant in this respect. (pp. 3–4)

According to Augier and Guo (2017), "military organizations compete on a significantly different level from business or non-profit organizations. Rather than trying to capture market share, military organizations seek to advance their nation's strategic goals and to prevent the enemy from accomplishing its goals" (p. 130).

Scholars have discussed both peace time and war time military innovations and their importance for national (Western) powers (Rosen, 1991; Murray & Millet, 1996). The operational environment in which innovations take place fundamentally change the way wars are fought. Rosen (1991), describes three changes caused by major military innovations:

a change in one of the primary combat arms of a service in the way it fights or alternatively, as the creation of a new combat arm...a change in the concepts of operation of that combat arm... a change in the relation of that combat arm to other combat arms and a downgrading or abandoning of older concepts of operation and possibly of a formerly dominate weapon system. (pp. 7–8)

Even during peacetime operations, military organizations are regarded as being unique and distinct from other organizations. Soeters et al. (2010) uses an analogy of *hot* and *cold* to describe the differences and similarities:

One deals with ‘cold’ peacetime and routine conditions, hence, resembling ‘conventional’ organizations. The other operates in ‘hot’ conditions, during crisis and peace operations or outright war. In the latter circumstances the military have the authority on behalf of the state to use violence and compel people to do things they would probably not do within the military’s actions and instructions...This authority makes the military and other ‘uniformed organizations’ exceptional. But even during peacetime conditions, the military is not just like any other organization. (Soeters et al., 2010, p. 1)

Carter (2014) argues for a unique symmetry between military innovation and the battlefield. He discusses the necessity of institutionalizing innovation in order to quickly adapt lessons learned from war, while yet perceiving new innovative approaches to future combat operations: “it is crucial to make permanent the institutional innovations resulting from the hard-earned lessons of Afghanistan and Iraq, while the experiences are still fresh. Too many lives were lost in the early years of those wars because the Pentagon failed to keep up with a changing battlefield. Never again should it make the same mistake” (p. 112).

Consideration of an organization’s context is essential to understanding how it interacts with innovative ideas and people. Within military organizations, this context is both intuitively understood and explicitly stated in military doctrine, directives, and publication manuals. In large part, military organization understand their operating context to be one of warfare. The overarching paradigm which best describes this environment is the three levels of warfare. Understanding how this environment impacts our understanding of innovation is the goal of the next section of the review.

2. Integrating Innovation at Various Levels of Warfare

Successful integration of innovations relies on an understanding of existing organizational paradigms. Within military organizations, a prevailing paradigm which assists leaders in visualizing linkages between strategy and tactics are the three levels of

warfare (Joint Chiefs of Staff [JCS], 2017). The levels of warfare provide a beginning framework for understanding the context in which military organizations operate and can be used as a starting point for discussing how innovation could potentially impact military strategy and tactics. Figure 1 illustrates the three-level framework applicable to joint operations.

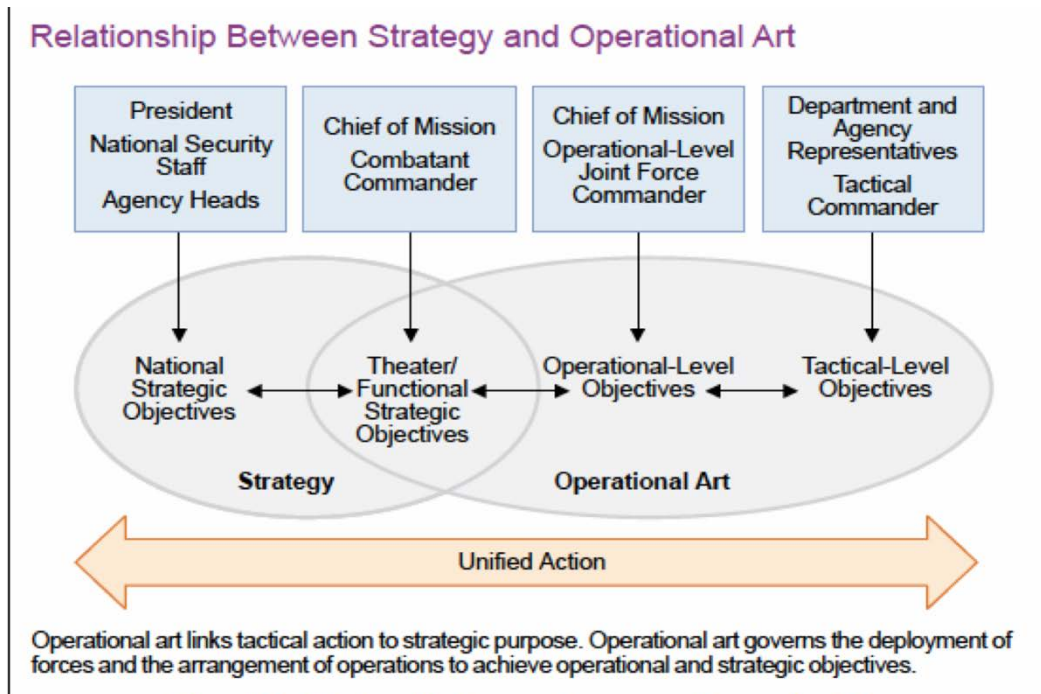


Figure I-4. Relationship Between Strategy and Operational Art

Figure 1. Levels of war framework. Source: JCS (2017).

Rosen (1991) distinguishes between major innovations affecting operations, and those more relevant to the tactical level, describing major innovations as “a change in the way individual weapons are applied to the target and environment in battle” (p. 8). Murray (1996) addresses the difficulty of assessing innovation at the strategic level of war: “Innovation takes place at all levels of war; perhaps the most difficult to understand are innovations that nations confront when major changes occur in the balance of power or the political framework within which war occurs” (p. 304). He continues to argue that understanding the strategic context of military operations are essential prerequisites to

military innovations: “the strategic arena, as well as political and military assessments of the strategic framework, is an essential prerequisite to successful innovation” (Murray, 1996, p. 305). Millet also comments on the essentialness of understanding the strategic environment’s influence upon military innovation during the interwar period: “The strategic evolution of the interwar period—from the flirtation with collective security in the 1920s to the hostile coalitions of 1939—influenced military innovation, perhaps more than any other factor” (Millett, 1996, p. 342). Rosen further affirms the importance of focusing innovations at the strategic levels of warfare:

When military innovation is required in wartime, however, it is because an inappropriate strategic goal is being pursued, or because the relationship between military operations and that goal has been misunderstood...A new strategic goal must be selected and a new relationship between military operations and that goal must be defined...Until the strategic measure of effectiveness has been redefined, organizational learning relevant to innovation cannot take place. (Rosen, 1991, p. 35)

Relating innovation to an organization’s existing paradigms can serve as a starting point to collectively discuss and understand its application. Discussion concerning how innovations ‘work’ within organizations however, will undoubtedly be characterized by examples of various outliers and misappropriations of a particular approach. This however, is to be expected within organizations whose operational environment is charged with unpredictability and complexity.

3. Prevailing Paradigms and Complexities

In addition to organizational structure and the presence of long-standing paradigms inherent to military organizations, there also exist multiple complexities which may slow the rate of innovation adoption. Bijlsma (2010) describes how complexities systemically plague military organizations:

Military organizations are systems designed to cope with a high degree of uncertainty. They have to operate in very dynamic and high risks environments where a large part of the information is ambiguous, imperfect or false...they are characterized by interactive complexity and tight coupling of organizational activities. Interactive complexity refers to irreversibility of process and multiple, non-linear feedback loops. Tightly coupled

organizations have little slack; actions in one part of the systems directly influence other parts of the organization. (p. 228)

Augier and Hughes also discuss the complexities inherent to military organizations attempting to employ innovation:

Most innovations take place in organizations, or need organizations to effectuate new inventions. Organizations can help and encourage, but sometimes stifle, innovation. As organizations age and grow (and most military organizations are both quite large and old) They first develop routines, rules and structures to improve efficiencies and get things done, but then the rules and bureaucratic processes often take a life of their own and multiply, resulting in organizational calcification. (Augier & Hughes, personal communication, April 10, 2018)

While it is possible for new technologies to simplify individual tasks, they may also be responsible for introducing greater complexities within military organizations. Shultz (2016) argues that innovative technologies often introduce new change and therefore tend to increase complexity within organizations. Without continuous and intentional transformation, Shultz argues, organizations embracing technological innovations could struggle to achieve repetitive success (Weick, 2000; Shultz, 2016).

Innovations occurring within DoD organizations must not only be described and understood within the proper context, but must also encounter the acceptance of dominant groups. Farrell (1996) describes how dominant groups within the ranks of military organizations can persuade the rate of innovation adoption:

Given that innovation is such a tall order, organisations have good reason to be slow to innovate. Moreover, those interests and beliefs which are dominant in an organisation are in a good position to remain so...The hierarchy of interests within organisations is also unlikely to change: dominant group interests become embedded in organisations and, from that dominant position, such groups are well placed to extend their networks into the policy environment to build coalitions in support of their interests. (p. 124)

The presence of dominant groups or hierarchal complexities within DoD organizations however, is not an excuse to avoid innovation or promote the acceptance of the status quo. The next section of the literature review identifies contributions intended to

deal with the complexities and uncertainties surrounding attempts to integrate innovations within DoD organizations. Key themes discovered during the review include,

1. The ability to initiate strategic and organizational communication surrounding innovation and innovation initiatives
2. The observation of innovation adoption as an organizational process
3. The ability to identify factors which contribute to the decline of a culture of innovation

Given the barriers and challenges to adopting new ideas within organizations, scholars have developed ideas and perspectives for how to overcome them. Although several potential solutions exist, those mentioned above seemed to repeatedly emerge as central to the discussion of the DoD's adoption of innovation, and are the final components of the literature review.

D. COMMUNICATING INNOVATION

1. Strategic Communication

The discussion surround the DoD's adoption of innovation begins with strategic-level communication (Millett, 1996; Murray, 1996; Rosen, 1991). The influence of legislation and policy on defense practices cannot be underestimated when considering the adoption of new ideas and methodologies. Hamre (2016) discusses the importance of maintaining policy and legislation relevant to the DoD's efforts to remain innovative in its approach to acquisitions and procurement:

The problem is that the Packard Commission decapitated the department's innovation ecosystem. This is not a critique of the people who have served as undersecretaries of acquisition. Each of them has heroically tried to be an innovator. But the Congress has handcuffed them to a legal framework that was (maybe) relevant in 1986 but is counterproductive in 2016. (para. 11)

Additionally, DoD organizations seeking to implement new ideas and innovative practices will often take cues from strategic-level guidance issued by senior leaders within the department. Joint Publication 3-0 affirms this notion in stating, "Military strategy,

derived from national policy and strategy and informed by doctrine, provides a framework for conducting operations” (JCS, 2017). Additionally, Sanders (2014), argues for the inclusions of clear and directive guidance from senior defense leaders for innovation metrics such as R&D spending:

In the face of pressure from ongoing operations and budget constraints, strategic choices will not happen without top-level guidance. The next secretary should articulate a clear vision and lay the groundwork for future programmatic and policy decisions. He or she has broad authority to describe priorities, necessary sacrifices, and supporting policies. Clarity will aid not just those within DoD but also those in industry that regularly complain about the absence of clear signals as to where internal R&D spending should be directed. (p. 4)

Within military organizations, innovation initiatives often extend from the guidance and influence of its leaders. The challenge henceforth is discovering how organizations can effectively disseminate this guidance. Leaders at the operational and tactical levels of defense organizations maintain the heaviest burden of group and interpersonal communication of innovations.

2. Group and Interpersonal Communication

Organizational leaders seeking to disseminate strategic-level initiatives must be willing to clarify their meanings in terms relevant to the organization’s mission. At the organizational-level of communication, middle managers (as opposed to senior executives), may pose the biggest communication challenge and have the least incentive to change. Gavetti, Giorgi, and Henderson (2005) discuss the challenges faced by Gorge M.C. Fisher, former CEO of Kodak, to overcome the “cognitive inertia” associated with this particular group:

Fisher has been able to change the culture at the very top. But he hasn’t been able to change the huge mass of middle managers...Fisher, who was used to dissent and open discussion in Motorola...felt Kodak’s executives avoided confrontations and venerated authority...Fisher tried to introduce the Motorola-style of open discussion, but change was difficult. The razor-blade culture of Kodak was so deeply ingrained that even disposable cameras had been considered almost sacrilegious. (p. 6)

Fisher's struggle to effectively communicate new ideas to Kodak's middle managers are not unfounded; however, innovations producing long-term effects must be transferred from individuals to groups. Okhuysen and Eisenhardt (2002) analyzed how individuals collaborate and interact in order to integrate personally-held knowledge into the larger organizational setting. Their study identifies effective group interactions that aid in transitioning individual knowledge to collective-level knowledge. Three specific interventions are suggested: information sharing, questioning others, and managing time (Okhuysen & Eisenhardt, 2002, pp. 370–371).

Giving attention to strategic-level and organizational communication helps emphasize the overall importance of innovation to an organization's members, however communicating an approach to an adoptive process may prove more challenging. The next section of the literature review accentuates an adoptive process which captures common trends experienced by organizations attempting to adopt innovations.

E. ADOPTING INNOVATIONS

Rogers, most known for his research surrounding the diffusion of innovations among individuals, also addresses the innovation adoption within organizations through what is known as the Five Stages Model (Rogers, 1995, 2003). The Five Stages Model particular model, which supporting the adoption of innovation within organizations, identifies two broad activities (Rogers, 2003, p. 420): initiation and implementation. Rogers (2003) argues that the adoption of innovations within organizations is not completed once the organization has simply decided to adopt a particular innovation. Instead, the innovation must undergo an implementation process that serves to further embed and sustain the innovation over a longer period of time (Green, 1986; Rogers, 2003). The two broad activities of adoption (initiation and implementation) consist of stages which describe the adoption process: agenda-setting, matching, redefining/restructuring, clarifying, routinizing (Rogers, 2003, pp. 420–435). This section of the literature review will utilize the Five Stages Model to describe innovation adoption at the organizational-level.

1. Agenda Setting

Agenda-setting is the initial stage of the innovation adoption process. During this stage, an organization identifies and prioritizes its needs, and attempts to locate a relevant innovative solution. Rogers (2003) defines agenda-setting as “the way in which needs, problems, and issues bubble up through a system and are prioritized in a hierarchy for attention” (p. 422). The agenda-setting stage consist of two subprocesses:

- (1) Identifying a problem or performance gap
- (2) Locating a potential innovation to partially or wholly mitigate the problem or performance gap

Agenda-setting is often difficult to achieve due to competing interests and differing views surrounding which problems are most important. According to agenda-setting theory, the media’s influence upon public opinion is a critical component to how senior government officials prioritize policy creation (Peake, 2001; Peake & Eshbaugh-Soha, 2008; Rutledge & Price, 2014).

2. Matching

Matching is the organization’s attempt to more closely align a potential innovation with the design of the organization. During this stage, organizations can test the innovation’s compatibility with its core operations and business processes (Goodman & Steckler, 1989; Rogers, 2003). If the innovation has been broadly applied in other organizational settings, the matching stage allows the adopting organization to uniquely “fit” and “test” the innovation with its current capabilities and processes (Rogers, 2003, p. 423). The matching stage consist of two subprocesses:

- (1) Fitting
- (2) Testing

Both fitting and testing allows the adopting organization to assess relevant benefits and problems associated with the potential innovation. The matching stage marks a transition within the organization’s initial courtship with an innovation to further stages which assist the organization in its implementation of the innovation. The results of this stage will help

the adopting organization reach a determination to reject the innovation or move on to the implementation phase. The next and final stages of the model represent actions taken by organizations to effectively implement innovation (Rogers, 2003).

3. Restructuring and Redefining

According to Rogers (2003) redefining/restructuring occurs when “the innovation is *re-invented* [emphasis added] so as to accommodate the organization’s needs and structure more closely, and when the organization’s structure is modified to fit with the innovation” (p. 424). During this stage, both innovations and organizations have an opportunity to mutually adapt prior to entering into the final two stages of adoption (Van de Ven, 1986; Rogers, 2003). The redefining/restructuring stage consist of two subprocesses:

- (1) Innovation re-invention
- (2) Organizational structure or process modification

Redefining/restructuring can be further explained by considering the impact of beta-testing on innovations and organizations. For example, beta-testing a new enterprise planning system could provide insights to an organization as to how it could restructure its workflow. The same beta-test might also inform software developers of needed changes to the graphical user interface of the system (Boland, 2013; Jacques, 2014). According to Rogers (2003), organizations should seek to maximize the benefits of re-inventing the innovation and exploring modifications to the organization’s structure or process prior to allowing the innovation to become more routine and embedded (Rogers, 2003).

4. Clarifying

Organization’s completing the redefining/restructuring stage of adoption should not assume the innovation is clearly understood and accepted within the organization. According to Rogers (2003), clarification of new innovations occurs, “as the innovation is put into more widespread use in the organization (p. 427). Two actions are critical for organizations undergoing intentional clarification of innovations:

- (1) Addressing questions of impact: According to Rogers, “When a new idea is first implemented in an organization, it has little meaning to the organization’s members and is surrounded by uncertainty. How does it work? What does it do? Who in the organization will be affected by it? Will it affect me? These are typical questions” (Rogers, 2003, p. 428).
- (2) Facilitating intentional discussions: According to Rogers, “As the people in an organization talk about the innovation, they gradually gain a common understanding of it. Thus, their meaning of the innovation is constructed over time” (Rogers, 2003, p. 428).

Clarifying innovations which have gained traction within the organization is often overlooked due to its deceptive nature. Often, organization leaders assume that matching and redefining/restructuring activities are representative of acceptance (Rogers, 2003). Advancing an innovation onward to the routinization stage, without addressing questions of impact or facilitating intentional discussions, can result in unnecessary “misunderstands” or “side effects” (Rogers, 2003, p. 248)⁵ The next and final stage, routinization, can only effectively take place once clarifying questions have been adequately addressed.

5. Routinizing

Innovations are considered to have reached the routinizing stage once they are able to be sustained without the use of special authorities or expertise (Rogers, 2003). Innovations reaching this stage of the adoption process are well integrated with other routine functions of the organization and are no longer consider to be foreign or separate (Rogers, 2003; Bertels, Howard-Grenville, & Pek, 2016). Routinized innovations, in some cases, are considered to have become institutionalized (Goodman & Steckler, 1989; Rogers 2003). There are two primary indicators of having reached the routinization stage:

⁵ Clarifying activities might include publically available memos, guidebooks, and whitepapers designed to provide a descriptive overview of the innovation. Such awareness campaigns can be separate from more prescriptive efforts to explains details of the innovation or routinize the innovation within the organization.

- (1) The degree to which organizational members have participated in the implementation of the innovation
- (2) The the degree to which adopters have been able to modify the innovation to fit the organization's realistic needs (re-invention)

The participation of organizational members in the implementation and re-invention of innovations may also be indicative of the organization's ability to sustain the innovation overtime. According to Rogers (2003), "When an organization's members change an innovation as they adopt it, they begin to regard it as their own, and are more likely to continue it over time, even when the initial special resources are withdrawn or diminish" (p. 429).

While a process illustrating how organizations adopt innovations does not explain every scenario, it can however, be used to better understand the *elements* involved in the adoption process. Furthermore, the implementations of innovation do not always equate to organizational success. The final section of the literature review addresses the rise and fall of the innovative culture at the RAND Corporation.

F. INNOVATIVE AT RISK

Process-driven solutions may not always satisfy the demands to successfully adopt innovations over long periods of time. In some cases, the solution may reside within the organization's ability to prioritize and sustain an innovative culture. Innovative cultures are hard to describe and seemingly more difficult to sustain over long periods of time. Additionally, sustaining a particular culture within a single DoD organization may prove challenging due to an organization's tempo and the turnover of key personnel. In other cases, however, difficulties to further innovative cultures may be stifled by the culture itself. Augier, March, and Marshall (2015) studied the rise and decline of the innovative culture at RAND and found that, "Self confidence, endurance, and growth produce numerous positive consequences for an organization; but for the most part, they undermine variety. Outliers and the conditions that produce them are not favored by their environments" (p. 1140).

The caution from Augier et al. to DoD organizations seeking to maintain an innovative culture is depicted by a thread of organizational successes and failures exemplified by DoD and commercial organizations alike (Lee, 2015). While no institution is exempt from the challenges associated with embracing innovations and an innovative culture, there does exist an array of lessons learned in order to educate and inform the next generation of innovators. Augier et al. (2015) offer three considerations for organizations seeking to maintain a culture of discovery (p. 1157):

1. Independent Discovery: Independent and simultaneous generation of ideas through the imagination of individuals. While this mode of discovery is not as responsive to others, it is heavily influenced by its organization structure and work environment.
2. Combinatoric Discovery: Imaginative stimulation occurring through interaction with others. An organization's structure might discourage or encourage such behavior.
3. A Culture of Discovery: Discovery, exploration, and imaginative thinking is central to the organizational ethos. While the origins of organizational culture are not explained, it includes interaction or collaboration; consciousness of distinctiveness; and the formulation and spread of mythic history.

The adoption of an innovative culture appears to be just as important as the adoption of innovation itself. Challenges beyond these two efforts exist as organizations attempt to maintain an innovative culture and mitigate its decline. The findings of Augier et al. (2015) accent the previous sections of the literature review by framing the lessons learned within the RAND Corporations in the context of individuals, groups, and culture. The following section will identify my contribution to the existing literature reviewed.

G. SUMMARY AND CONTRIBUTION TO EXISTING LITERATURE

This chapter reviewed existing literature regarding the topic of innovation adoption within DoD organizations. Specific attention was given to the adoption of innovation

within organizations, as opposed to individuals; and various decisions and behaviors affecting the DoD's means and rate of innovation adoption.

Given the apparent challenges within DoD to adopt innovations, three themes were extracted from the existing literature which identified how DoD can more effectively adopt innovation:

1. The ability to initiate strategic and organizational communication surrounding innovation and innovation initiatives
2. The observation of innovation adoption as an organizational process
3. The ability to identify factors which contribute to the decline of a culture of innovation

The DoD is not new to the practice of adopting innovations, and as such, the following chapter will provide examples of short cases wherein the department has pursued such efforts. My contribution to the existing literature will be to provide an analysis, using the literature reviewed, of the DoD's adoption of contracting framework used to construct innovative agreements with commercial organizations: other transactions authority (OTA).

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III. EMPERICAL CASE STUDIES

Innovation is usually a group effort, involving collaboration between visionaries and engineers, and that creativity comes from drawing on many sources. Only in storybooks do inventions come like a thunderbolt, or a lightbulb popping out of the head of a lone individual in a basement or garret or garage. (Isaacson, 2015, p. 85)

The cases presented within this chapter are used to demonstrate the DoD's adoption of other transaction authority. In order to better understand the conditions leading to DoD's adoption of OTA, the inception of OTA within NASA has been included. The contents of the case will be analyzed in the following chapter in order to better understand how DoD can strengthen its efforts to adoption innovations.

A. THE ORIGINS OF OTA AT NASA

The phrase "other transactions" was first included in the Space Act of 1958 to afford NASA the ability to construct what would later be known as Space Act Agreements (SAAs).⁶ These agreements would be used to allow commercial companies to leverage NASA's facilities and equipment during R&D activities supporting space launch and exploration efforts. The presidential administration of 1958 provided clear strategic guidance surrounding NASA's establishment and its purpose. Innovation and speed quickly emerged as a common theme within the administration, as maintaining a technological edge was considered essential to a strong national defense posture (National Aeronautics and Space Administration [NASA], 1966).

The creation of both NASA and ARPA in 1958 represents U.S. efforts to prioritize the integration of commercial, scientific, and defense innovation. Central to the innovativeness of both NASA and DARPA has been their ability to construct creative R&D agreements in order to attract innovative commercial companies. Both organizations have historically leveraged unconventional means to acquire unique talent and exercise flexible

⁶ Originally 51 U.S.C. §§ 20101-20164, grants NASA this authority. Specifically, Section 20113(e) of the Space Act (NASA, 2014).

authorities in order to achieve breakthrough technologies (DARPA, 2016).⁷ In NASA's case, OTA was used to construct flexible agreements with commercial organizations in a way unfamiliar to existing federal procurement statutes. The Space Act's initial author and first general counsel to NASA, Paul G. Dembling, explains the use of OTA terminology at the onset of NASA's establishment:

While it is common for Federal departments and agencies in their organic or authorizing statutes to be provided authority to enter into contracts, leases, and cooperative agreements, I wanted to assure that the organization met any contingency that might arise, and so I added the language for "other transactions." The Space Act, for the first time, authorized an agency, NASA, to enter into "other transactions." (Dembling, 2008, p. 211)

Clearly, Dembling's intent in using the terminology was to ensure that federal procurement regulation, never adversely impacted the execution of NASA's mission. Additionally, NASA viewed SAA's as a partnership in which they would provide many of the resources needed to successfully conduct R&D and prototyping capability (NASA, 20104). For example, in 1962 NASA used OTA to constructed creative agreements with AT&T in support of the first active satellite launch, TELSTAR I (Granath, 2012). The agreement was arranged on a reimbursable basis, meaning that AT&T would cover expenses related to the satellite's initial prototype (Dunn, 2009). Over the past several decades, NASA has developed an organizational competency around crafting unique SAAs that would stimulate both scientific and commercial innovation.

B. OTA'S ENTRANCE INTO THE DOD

The mission of DARPA is to "serve as the central research and development organization of the Department of Defense with a primary responsibility to maintain U.S. technological superiority over potential adversaries" (Defense Advance Research Prototype Agency [DARPA], 2017).

As opposed to NASA's initial use of the statute, DARPA would work more closely with the Department of Defense on researching advance technologies and future concepts

⁷ There were other innovative initiatives and think tanks that emerged, for instance the RAND Corporation (Augier et al., 2015).

of operation (NASA, 1966). In collaboration with commercial companies and research institutions, DARPA has helped fund lofty technological breakthroughs such as the Internet, miniaturized GPS technologies, flat-screen displays, the Personal Assistant That Learns (PAL)—also known as Apple’s Siri, and a brain-computer interface making it possible to control limbs with the human brain (DARPA, 2017).

Despite DARPA’s successes in advanced R&D, the organization’s expertise remained separate from the DoD’s core R&D operations performed by military program offices. Graham et al. (1988) discusses the impact of DARPA’s prototyping mission with DoD program offices: “it is expected that the shorter lines of management and the streamlined decision process within DARPA will enable these programs to progress more quickly” (Graham et al. 1988, p. IV–9). After more than thirty years of existence, DARPA received other transaction authority in 1989 through the creation of 10 U.S.C. § 2371. Upon its receipt of OTA, DARPA’s overall mission remained mostly unchanged, notwithstanding its ability to more readily impact R&D directly related weapon systems; to include advance research supporting dual-use technologies.

DARPA’s use of OTA not only granted the military services access to advance technologies supporting existing weapon systems, but has also encouraged DoD leaders to consider other applications of OTA. The following section will discuss the use of OTA in the case of Defense Innovation Unit Experimental (DIUx). The focus of this organization, however, would not be existing DoD weapon systems, but rather the design and implementation of innovative business practices to provide the DoD with access to commercial technologies. See Figure 2 for DIUx’s major milestones and accomplishments.

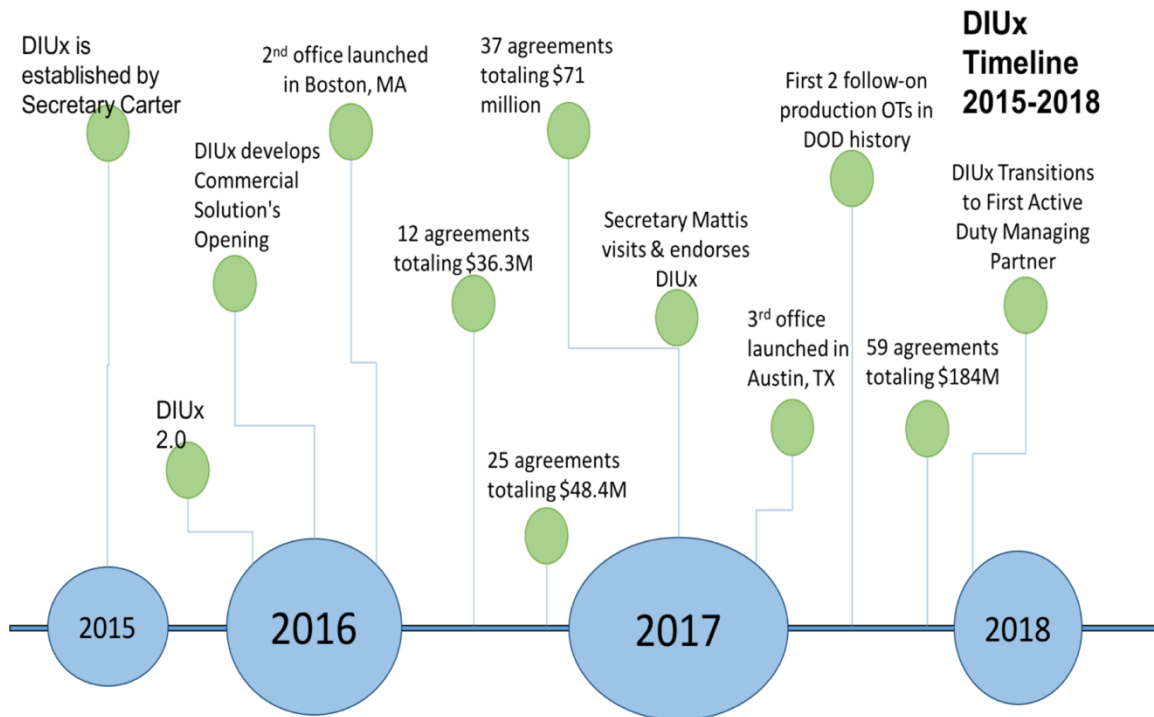


Figure 2. DIUx from 2015–2018. Source: DIUx (2017a).

C. DIUX BACKGROUND

In 2015, 57 years after the Space Act of 1958, the DoD continued its pursuit of new and innovative means to access commercial technologies with military applications. In 2015, the Deputy Secretary of Defense released a memorandum detailing the creation of a “New Point of Presence” for the department in Silicon Valley (SV) (Work, 2015). According to the memo, The Defense Innovation Unit Experimental would seek to “increase the DoD’s communication with, knowledge of, and access to innovating, leading edge technologies from high-tech, start-up companies and entrepreneurs” (Work, 2015). In doing so, the organization sought to build rapport with organizations which had traditionally steered away from doing business with the government. The organization’s initial mission statement as provided within the memo seemed more fitting for a venture capitalist firm than a defense organization: “to strengthen existing relationships and build new ones; scout for breakthrough and emerging technologies; and function as a local interface node for the Department” (Work, 2015). In keeping with its intent to access some

of the world's newest technologies, DIUx embarked upon a mission to established credibility and build new relationships within an international start-up hub.

D. DIUX 2.0: LEADERSHIP SHIFT

After a slow start in 2015, Secretary Carter announced an enhancement to the existing organization which would provide an overhaul in personnel and focus upon creating a mechanism that would facilitate transactions with small, start-up companies (DoD, 2016). In May 2016, utilizing special hiring authorities, OSD recruited an entirely new brand of leadership.⁸ This new team would consist of a hybrid of military reservists having extensive experience with venture-backed start-ups, commercial executives, and technical experts well-versed in the intersection between commercial innovations and national defense.⁹

E. DIUX 2.0: DEFENSE SECRETARY ENDORSEMENT

This new team set out to transform the organization's approach to outreach and to further solidify its commitment to access innovative commercial technologies. By the end of the following month, the newly formed team oversaw the development of a new business process that would leverage its granted authority to construct creative agreements with potential companies. The Commercial Solutions Opening (CSO), primarily constructed by DIUx's Pathways team, was a sleek and user-friendly mechanism for the DoD to become a non-dilutive investor in new and emerging technologies. The CSO provided a business arrangement that was both familiar and compatible to the start-up community of SV. By the end of the year, 12 agreements had been reached using the CSO process. The flexible design of the CSO was based on a newly granted authority within other transaction statuses.

⁸ According to DIUx's 2017 Annual Report, the organization used several authorities to access a broader range of talent such as the Intergovernmental Personnel Act (IPA), Presidential Innovation Fellows (PIF), Presidential Management Fellows (PMF), Special Government Employees (SGE), and the Highly Qualified Experts (HQE) authority.

⁹ According to biography information, the new leadership background included a serial entrepreneur and Senior Director from Palo Alto Networks, former head of operations at Google X (Google's R&D branch), and a former director of strategic planning at the National Security Council. Prior to DIUx 2.0, the organization's leadership talent included, among other things, a former DARPA Program Manager and a senior member of the Naval Special Warfare community.

In 2016, 10 U.S.C. § 2371(b) gave the DoD the authority to enter into other transactions in order to carry out prototype projects relevant to enhancing the mission effectiveness of military personnel.¹⁰ This provision of authority laid the groundwork for DIUx to design the CSO in support of accessing commercial technology from small, nontraditional companies in SV and other innovative hubs throughout the U.S.

With the CSO in place, the commercial community moved swiftly to participate, however it would take more time to convince DoD customers of its potential. The ultimate test would be winning the approval of a new Secretary of Defense, Jim Mattis. Secretary Mattis, who served 44 years as a Marine, commented after his August, 2017 visit to DIUx's SV office: "There is no doubt in my mind that DIUx will not only continue to exist, it will actually grow in its influence and its impact on the Department of Defense...And one of the ways that you make certain that you don't have bad processes eat up good peoples' ideas is you make certain that you remove the bad processes and organize for success" (J. Mattis, personal communication, August 10, 2017).

F. ORGANIZED FOR SUCCESS AND INNOVATION: COLLABORATIVE WORKFLOW

Infused with the endorsement of a new Secretary of Defense, DIUx set out to further strengthen its ability to facilitate a growing demand among its DoD customers and newly found industry partners. Armed with insight from tech talents and special authorities from Congress, DIUx endeavored to transform both its workflow and work environment. After multiple iterations of engagements with industry and project planning, DIUx slowly began to develop its own unique competencies using commercial software for collaborative workflow between its team members, DoD partners, and industry. Seamless video and chat-enable communication tools allows the organization to collaborate with team members and customers in real time. Since the collaboration software tools used at DIUx were purely commercial, many of the start-ups firms pitching their innovative solutions to DoD customers were able to quickly access DIUx project managers (PMs) to provide

¹⁰ 10 U.S.C. 2371(b)

updates to projects or schedule pitch briefs. This not only sped up the project completion cycle-time, but removed barriers common to DoD and industry collaboration efforts.

G. ORGANIZED FOR SUCCESS AND INNOVATION: WORK ENVIRONMENT

We know from the strategy and management literature that it is not enough to have good people and resources in an organization; they must also be organized in ways that the resources, ideas, capabilities, and processes all have a strategic fit, within both the organization, and between the organization and its environment. In addition to the intellectual organization, the physical organization can be important, too (Augier et al., 2015). Thus, DIUx 2.0 set out to enhance its work environment. Although projects could be managed remotely and often required travel, the headquarters office in Silicon Valley was intentionally designed for innovation, creative thought, and interdisciplinary collaboration. Almost no one maintains an office or office hours. Project managers especially must, somewhat, embody the work they do, as opposed to engaging with projects upon showing up to work. A six-month internship as a DIUx project manager quickly taught me that work was not simply a place I went, but what I did. Quite often, my work as PM would have to be conducted remotely and meetings were constantly managed among shifting time zones. But, while in the office, I was able to easily discuss major project milestones and upcoming due-outs with managing partners, portfolio leads, or other team members.

The leadership of DIUx remained not only visible and accessible, but highly responsive. Various team and portfolio members talked openly and candidly over coffee, whiteboards, and Pop-Tart snacks, while others closed themselves off into a client-customer room equipped with live video chat technology to discuss an upcoming project. The organization was uniquely *flat*, and as a result, projects supporting major DoD procurements were being conducted in record quantities and with speed. By the end of

2017, DIUx had executed more than 60 projects totaling over \$185 million since its creation of the CSO in 2016 (DIUx, 2017a).¹¹

H. THE COMMERCIAL SOLUTIONS OPENING (CSO)

Perhaps because the organization constantly sought new ways to understand and solve problems, the term *process* was not often used at DIUx. My understanding of its omission was the organization did not yet want to strictly prescribe a particular *way* in which projects ought to be executed. It really would depend on the nature of the project: the needs of the customer, the proposed timeline until completion, and how the project fit within the (customer) organization's overall strategy. What was discussed quite often, however, was the idea of maintaining a culture of *shared awareness*. Although this was not explicitly defined for me during my tenure, what was demonstrated regarding this term was a savviness within the organization to communicate important details in a way that seemed both natural and interactive. By the term natural, I mean that there was not a meeting arranged each time something important needed to be done. Quite often, I would meet partners or executives in the hallway who would ask about projects or offer advice on dealing with stakeholders. Howsoever the term may be understood, it was clear that DIUx had a knack for furiously communicating project details across the organization. This may be contributed to the in-depth knowledge and expertise of its team members or the rigorous project *awareness* initiatives. In my observation, the core channel of communication and organizational chemistry came not only from the work environment, commercial software tools, or talented workforce; but from the workflow *process*.

The CSO, authored by the DIUx Pathways team, is DIUx's business process used to deliver innovation technologies to meet mission-critical needs of DoD's warfighters. The process itself is not prescribed any particular acquisition regulation (and therefore it can remain adaptive and a tool to improve innovation). It is instead, a part of DIUx's business model designed to swiftly access commercial technology, while operating along the parameters of existing regulations. The concept of DIUx's CSO is captured in their

¹¹ Total number of projects undertaken does not equal total number of prototype awards or follow-on production awards.

2016 CSO guidebook: “Fast, Flexible, and Collaborative: The Commercial Solutions Opening (CSO) and DIUx’s Approach to Other Transactions (OT) for Prototype Projects” (DIUx, 2016a; DIUx, 2016b).

I. CSO COLLABORATION

Pre-CSO activities begin with design-thinking and problem curation between the DoD customer and DIUx PMs, followed by initial market analysis to identify existing solutions within the innovative industrial base. Weekly briefs with portfolio members across the country facilitate shared awareness of each projects stage and priorities. The final determination to launch a new CSO is determined by an approval board consisting of managing partners, the PM, DIUx commercial executives, and portfolio leads. If the project is approved, the CSO initiates a competitive process with an average lead time of 90 days to award the initial prototype agreement. Successful prototypes can be successfully transition to a production agreement if the customer deems the prototype successful. The potential to transition prototype projects to production agreements could prove disruptive to acquisition and procurement processes following a more traditional pattern. The alternative however, is that DoD organizations requiring innovative means to access commercial technologies could leverage the lessons learned at DIUx to become better equipped for success and organized for innovation.¹²

J. SUMMARY

This chapter provided a case regarding the DoD’s adoption of other transaction authority. Additionally, empirical observations were made regarding its use within DIUx as demonstrated within the CSO process. The following chapter will use the Five Stages Model for innovation adoption and other key themes from the literature review in order to provide an analysis of the case presented within this chapter.

¹² Also see Williams, L.C. (2017) for senior officials’ perspective on DIUx’s impact on the overall defense acquisition system

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IV. DISCUSSION AND ANALYSIS

A. APPROACH TO ANALYSIS

This chapter will analyze the DoD's adoption of OTA as a means of constructing innovative agreements with commercial organizations. Key themes discovered during the literature review will be used to analyze the short cases and empirical information presented within the previous chapter. The analysis will be conducted in two parts representative of key insights extracted from the literature review:

- (1) Communicating Innovation
- (2) Adopting Innovation

Each part of the analysis will provide a brief overview of the theme, its relativity to the short cases, and supporting examples to further strengthen the analysis.

B. COMMUNICATING INNOVATION

Strategic communication of innovations as represented through relevant legislation and strategic-level guidance.

1. Strategic-Level Guidance

Strategic-level guidance for the creation of OTA was not explicitly mandated. The Eisenhower administration identified a capability gap and potential threat to national security. Although strategic-level guidance did not directly mandate the creation of OTA, those responsible for its creation understood the nature and intent of the guidance provided and were able to create a policy relevant to the needs identified by strategic-level leaders.

2. Relevant Policy

NASA was established by the Space Act of 1958 in response to the launch of Sputnik I and to develop competitive space launch and exploration capabilities. Strategic-level concerns surrounding the launch of Sputnik I not only drove the creation of the Space Act, but became the agenda-setting mechanism for the creation and use of OTA; and

eventually the federal statute applicable to DoD in 1989. OTA was initially created to support policy specifically relevant to NASA's strategic-level mission.

3. Group and Interpersonal Communication within Organizations

The initial procurement training conducted at NASA in 1961 was facilitated by the Army whom had transferred a large part of the DoD's missile programs to the new administration. It is not clear that this training included the use of OTA; however, what can be extrapolated is that the training being provided was extremely helpful in assisting NASA's management of DoD programs (NASA, 1966). NASA's initial use of OTA focused not on the DoD programs of which it had inherited, but rather on its collaboration with commercial organizations; such as in the development of TELSTAR I.

Of note, however, is DoD's possible exposure to OTA during the period between 1958 and 1989. Since, no strategic or policy-level initiatives explicitly propagated OTA's use within DoD between this time period, it is likely that the knowledge surrounding the use of this authority was transferred through individuals, such as Richard Dunn, who transferred from NASA to DARPA in 1987 two years prior to DoD's initial authorization to use OTA in support of advance research ("Strategic Institute," n.d.).

Strategic and organizational level communication was initiated with NASA and eventually transferred to the DoD in 1989. Although authority to use OTA was approved by congress, the DoD had not yet integrated the framework for its use within its existing programs and business practices. Using the Five Stages Model for innovation adoption, the following section will analyze the DoD's process of integrating OTA within DARPA and subsequently DIUx.

C. ADOPTING INNOVATION

The Five Stages Model will be used to help provide an analysis of the DoD's adoption of OTA.¹³ As previously stated, analyzing the adoption of innovations within

¹³ Among other analytical models are the Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis; Political, Economic, Social, Technological, Environmental, and Legal (PESTEL) analysis; and Porter's Five Forces. However, the Five Stages Model was specifically designed to analyze an organization process of adopting innovations.

organizations is not an exact science, however its undertaking has the potential to reap rewards not realized if avoided. Rogers (2003) briefly addresses the challenges of analyzing innovation at the organizational level:

The general assumption of research on innovation in organizations is that organizational variables act on the innovation behavior in a manner over and above that of the aggregate of individual members of the organization. Thus, the organizational context of these innovation process studies adds a kind of intellectual ‘supercharger’ to the analysis. (Rogers, 2003, p. 418)

As presented within the literature review, the Five Stages model discusses two phases within the process of innovation adoption: 1) initiation (agenda-setting and matching) and 2) implementation (redefining/restructuring, clarifying, and routinizing) (Rogers, 2003). The Five Stage model will be applied to the integration of OTA within DoD organizations. OTA has been used sparingly across the DoD; however, the three organizations presented within the case have played a significant role in the creation of OTA and its integration into DoD organizations. This analysis will cover each phases as well as I will use the two phases of analysis to better understand the process of integrating OTA within the DoD. This analysis will not cover each federal agency or DoD organizations which have used OTA, but rather it will cover those organizations that will pivotal in the creation of OTA as well as its entrance into the DoD. Additionally, the analysis will analyze DIUx as a DoD organization currently using OTA in its most recent statutory form: 10 U.S.C. 2371(b).

The initiation phase will be used to explain the process of adopting OTA as a policy mechanism to integrate commercial business practices at both NASA and DARPA.¹⁴The phase will cover the agenda-setting and matching stages within these organizations. The second phase analyzes DIUx’s implementation of OTA. The specific stages of this phase are redefining/restructuring, clarifying, and routinizing. Although a brief analysis of the initiation phase is provided, I assumed the analysis of DIUx’s implementation of OTA to be a more relevant undertaking. These three reasons support my assumption: 1) During my

¹⁴ Although NASA is a civilian agency, research on the organization shows that several defense programs, including some being led by ARPA, were transferred to the organization during the initial years of their existence (NASA, 1966).

short tenure at the organization, we were heavily focused on the three stages involved in implementation: redefining/restructuring, clarifying, and routinizing. During my first day as an official Xer,¹⁵ the DIUx team celebrated its first-ever production OT¹⁶ and later found itself undergoing further cycles of restructuring, clarifying, and routinizing in order to integrate business practices that would support production OTs. 2) The underlying policy which reinforces the DIUx business model, OTA, has undergone intense agenda-setting and matching activities since its origins in 1958. OTAs are extremely mature in the initiation phase activities as will be demonstrated in the brief analysis of NASA and DARPA. 3) Organizations wishing to adopt certain practices or lessons learned will likely find it critical to understand and apply the stages within the second phase. Collaboration within DoD customers during projects revealed a point of friction which is central to the theme of this thesis: other DoD organizations seeking to collaborate on a DIUx project could easily become frustrated during attempts to implement innovative business practices within their organizations. Such business practices were central to the effective execution of OTA-related projects.

1. Agenda-Setting Analysis

As previously discussed, agenda-setting is the way which organizations prioritize problems, needs, and issues. Central to the prioritization of problems is the ability to identify performance gaps (Rogers, 2003). Rogers states that performance gaps can “trigger the innovative process” (Rogers, 2003, p. 422). As the most important problems within the organization are being identified, its members also begin to locate potential innovation solutions. During the onset of the Cold War, the U.S. proposed that high priority be placed on space launch capabilities requiring intense R&D activity. In order to achieve this high-level of intensity and provide solutions at a speed relevant to the U.S. agenda, the Eisenhower administration endorse the establishment of NASA (NASA, 1966). The founding documents of the organization included a flexible mechanism to carry out

¹⁵ A term of endearment among members of the organization; predominantly espoused by a few of its managing partners.

¹⁶ This was the first production OT awarded in the history of the DoD (DIUx, 2017b).

transactions with industry; simply termed other transactions. NASA's first General Counsel and the author of the Space Act, Paul G. Dembling, references the problem the new organization was attempting to solve and the innovative solution he identified:

I wanted to assure that the organization met any contingency that might arise, and so I added the language for "other transactions." The Space Act, for the first time, authorized an agency, NASA, to enter into "other transactions." This authority is without limitation. Since such a transaction is not a procurement agreement, it is not subject to the laws, regulations, and other requirements applicable to contracts, leases, cooperative agreements. It is this flexibility which provides authority to structure agreements in accordance with standard business practices. (Dembling, 2008, p. 211)

NASA's launched the first active satellite using OTA. This particular agreement was structured on a reimbursable cost-basis for the design of AT&T's TELSTAR I. In order for OTA to begin the integration process within DoD however, it would have to be matched to the specific needs of that particular organization.

2. Matching Analysis

According to Rogers (2003), the matching stage involves two key activities: fitting and testing. This portion of the analysis will assess DoD's fitting and testing activities surrounding its use of OTA within DARPA. I have divided the analysis into two sections: a) properly fitting OTA within DoD programs and b) testing OTA within DoD existing programs and processes

a. Properly Fitting OTA within DoD Programs

Although OTA had been used by NASA since 1958, it was not yet integrated into the DoD until 1989. The process of integrating OTA began in an initial provision of the authority to DARPA.¹⁷ Although other agencies have received and used this authority,¹⁸

¹⁷ Initial authority from Pub. L. No. 101-189 § 251

¹⁸ These agencies include Department of Energy (DOE), Advanced Research Projects Agency-Energy (ARPA-E), Department of Health and Human Services (HHS), National Institutes of Health (NIH), Department of Homeland Security (DHS), Domestic Nuclear Detection Office (DNDO), Transportation Security Administration (TSA), Department of Transportation (DOT), and Federal Aviation Administration (FAA) (Neumann, 2016)

its initial integration within DoD is mainly results from the relationship between NASA and DARPA. Upon leaving his post at NASA, Richard Dunn became the first General Counsel of DARPA in 1987 (“Strategic Institute,” 2018). Dunn further explains the connection between the two agencies: “One problem NASA faced (or created) was concern that SAAs¹⁹ could provide goods and services to a partner but not funding... That reticence was eventually overcome when DARPA began using funded OTs under Section 2371 (1989)” (Strategic Institute for Innovation in Government Contracting, 2018, p. 14).²⁰ The DoD’s OT authority, administered through DARPA, would be heavily focused on enhancing the R&D process within DoD’s existing program offices (Graham et al., 1988; Dunn, 1996).

b. Testing OTA within DoD Existing Programs and Processes

Remember the quote about DARPA being able to now be a part of transitioning from milestone I to II (Graham et al., 1988). According to Rogers (2003), matching involves anticipating the benefits, and the problems, that the innovation will encounter when it is implemented. The organization’s decision-makers may conclude that the innovation is mismatched with the problem” (p. 423). The initial authority received by DARPA to use OTA was accompanied by sunset provisions. This provided DoD leadership an opportunity to assess the feasibility of OTA as it was applied in conjunction with existing DoD programs. Assessing the feasibility of a new innovation is core to the matching stage. It allows the organization to closely assess the hypothetical performance of the innovation’s use in conjunction with existing business processes and programs. DARPA’s preliminary use of OTA, as applied to DoD’s weapon system programs, provided the testing-grounds for its future use within other DoD organizations. Overtime, these temporary provisions have become permanent within DoD, potentially signaling their transition from the matching stage to the redefining/restructuring stage.²¹ For these reasons,

¹⁹ Space Act Agreements (SAAs).

²⁰ See Dunn (1996), for a several changes made to the original statute.

²¹ See Neumann (2016) for a more detailed description of agencies using OTA under provisional authorities such as DOE and DHS; since 2005 and 2002, respectively.

the matching stage is central to an innovation's progress within the adopting organization; and its completion marks a transition from the initiation phase to the implementation phase.

According to Figure 3, no significant changes have been made to the Space Act since the late 1980s. Figure 4, however, depicts an influx of legislative matching activities surrounding DARPA's § 2371 authority during that same period.

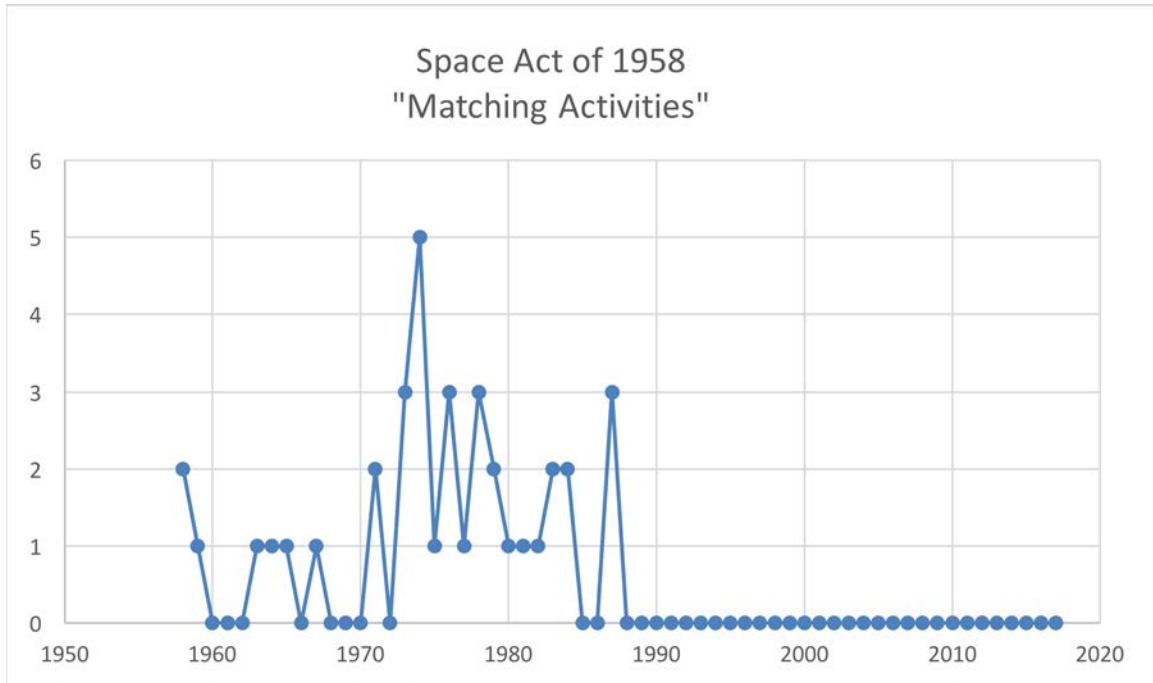


Figure 3. OTA Matching Activity, 1958–2018. Source: Pub. L. No. 85–568

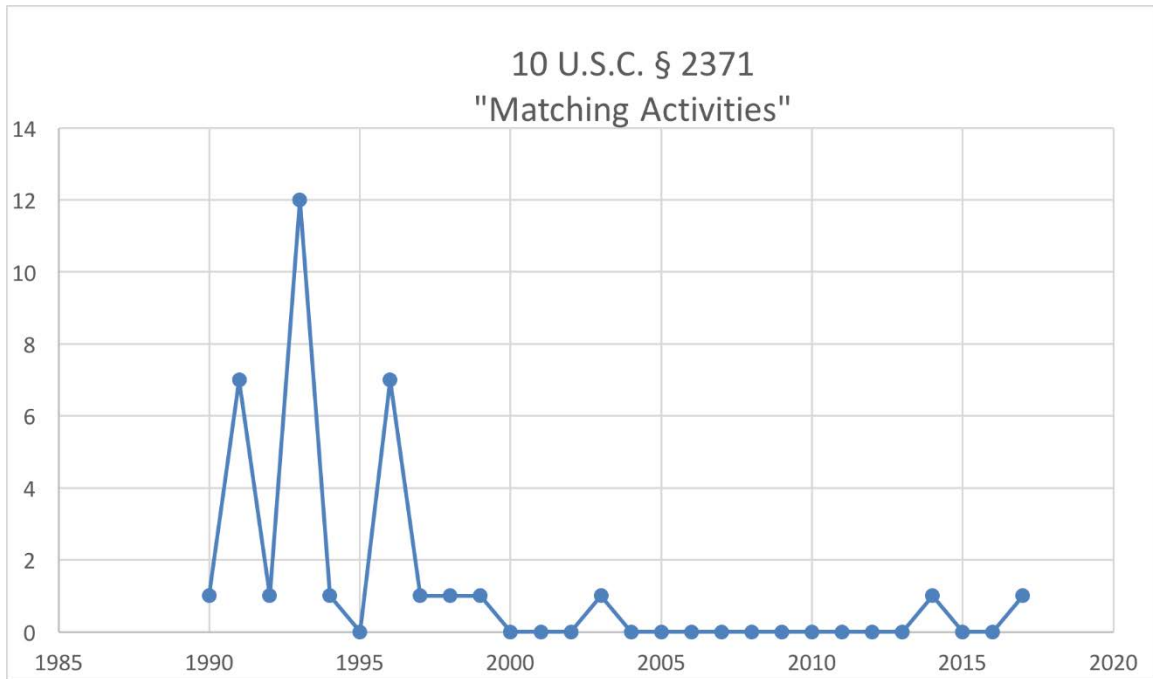


Figure 4. OTA Matching Activity, 1989–2018. Source: 10 U.S.C. § 2371

3. Redefining/Restructuring Analysis

The redefining/restructuring stage within organizations marks a clear point of departure from the initiation of an innovation to a focus on implementing the innovation (Rogers, 2003). Again, focusing upon the implementation steps (redefining/restructuring, clarifying, and routinizing) within DIUx does not imply that NASA or DARPA did not reach a successful state of implementing this particular innovation. In fact, the declined use of OTA within DoD set the stage for a new and meaningful alternative use, as demonstrated within DIUx. Dunn (2018) describes the lagging implementation of OTA within DoD:

Despite the numerous success and demonstrations of better, faster, and cheaper approaches to Defense acquisition, use of these authorities dropped off dramatically for over ten years. Only recently has DODs need for speed and innovation in fielding new capabilities seen a partial resurgence in their use. Congress has repeatedly called for more innovation in defense acquisition and the previous Secretary of Defense created the Defense Innovation Unit Experimental (DIUx) to try to bridge the gap between innovative private sector companies and needed defense capabilities. (p. 15)

DIUx's approach to acquisitions and innovation is definitively experimental. The design of the CSO allows for a considerable period for DoD customers to test innovations in the form of prototype projects. If the innovation provided by a commercial company, matches the need of the DoD customer, DIUx will seek to move on to the next stage of adopting the innovation: redefining and restructuring.

4. Clarifying Analysis

Clarifying activities are demonstrated by deliberate attempts to address potential concerns surrounding the innovation. Clarifying activities undergone by the organizations being analyzed, sometimes took the form of stakeholder awareness initiatives, during which interested parties could learn more about how the innovation might potentially enhance or modify the stakeholder's future operations and business processes. In other cases, clarifying activities take the form of developing whitepapers, guidebooks, and other forms of communication in order to disseminate basic knowledge about the details of an innovation. For example, the Grant and Agreement Regulations of 2011 serves as guidance for some R&D projects, while the Other Transactions Guide for Prototype Projects (2002, 2017) serves as guidance for prototype projects.

In the case of DIUx, they appeared to take a more aggressive stance to internally routinize the CSO process with the organization, prior to conducting intense clarifying activities. After developing a routinized process, the organization focused more on clarifying the CSO to a broader DoD community.²²

5. Routinizing Analysis

According to Rogers (2003), "Routinizing occurs when an innovation has become incorporated into the regular activities of the organization and has lost its separate identity. At that point, the innovation process is completed" (pp. 428–429). OTA's long-term use

²² During my time as a DIUx PM, partnering with DoD customers during the problem curation phase of a project not only involved identifying potential innovative solutions, but spending time clarifying the business process surrounding OTA. In this way, I was able to integrate clarifying activities within individual projects (and whenever else needed), while the organization as a whole continue honing routinization activities to further strengthen the CSO's implementation. Forgoing clarifying actions completely, could potentially frustrate DoD customers who were more accustomed to mainstream approaches to government procurement

within NASA and DARPA immediately hint that innovative practices surrounding the authority has become fairly routinized within both organizations. However, a decline in OTA usage within DoD could signaled that the authority has not completely lost its identity as a rather novel concept within DoD acquisitions. Additionally, 10 U.S.C. 2371(b) is no longer provisional, thus signaling a stronger posture towards the institutionalization of OTA. The institutionalization of OTA can be partially seen in its transition from a provisional or sunset authority to a permanent statute.

Figure 5 provides strong indication that NASA has reached the routinizing stage of OTA usage.²³ The finality of its usage within NASA defends its position within the routinization stage. According to Neumann (2016),

NASA cannot use an other transaction agreement for any activity that could be completed using a contract, grant, or cooperative agreement. Moreover, any project which primarily benefits NASA or is intended to meet a NASA need must be performed using a contract rather than an other transaction agreement (p. 21).²⁴

²³ See Neumann (2016).

²⁴ See Neumann (2016) for details surround NASA's use of OTA. One of the primary uses is rental and use of NASA's facilities on a reimbursable basis (Neumann, 2016).

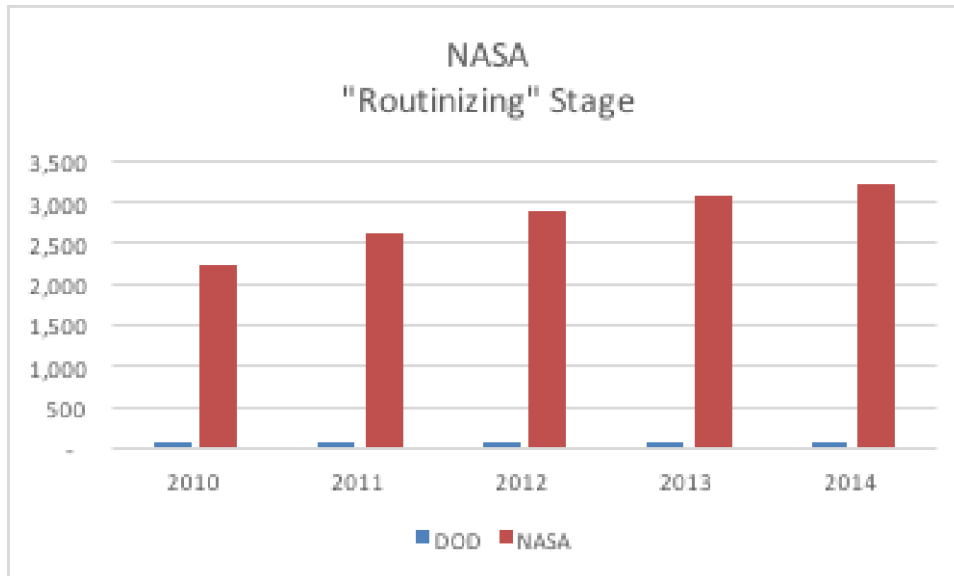


Figure 5. NASA and DoD OTA Activity. Source: Neumann (2016).

NASA’s highly frequent use of OTA demonstrates its own particular use of the authority, which is not congruent with its use within DoD. Whereas NASA has traditionally used OTA as a means to provide commercial organizations with the facilities need to perform space-related R&D, the DoD has used the authority to enable joint ventures between small, nontraditional companies and DoD as well as to promote novel applications of commercial technologies for defense purposes.

D. CHAPTER CONCLUSION AND SUMMARY

The purpose of this analysis was to evaluate the DoD’s adoption of other transactions authority. Specific attention was not only given to the adoption process, but the DoD’s ability to adequately communicate the innovation to those who would be responsible for its initiation and implementation. Clear strategic-level initiatives provided the initial guidance for including terminology aimed at the adoption of innovative commercial business practices by NASA. Eventually, the innovation was initiated within DoD in 1989 for the purpose of conducting advance research. Since that time, the authority has been re-invented on several occasions in order to meet the expectations and needs of DoD’s mission. Overall, the implementation of OTA is not primarily about understanding policy, contracting, or even innovation. It is primarily an effort of understanding human

interactions and how members of an organization relate to one another. The following chapter will identify the key findings of this analysis and provide recommendations, lessons learned, and potential areas of future research.

V. LESSONS LEARNED AND CONCLUSIONS

This chapter utilizes lessons from both the literature review and case analysis to provide findings and recommendations in support of DoD organizations attempting to more effectively organization for innovation. The findings and recommendations additionally reflect the key themes identified in both the literature review and case analysis.

A. FINDINGS AND RECOMMENDATIONS

a. Finding 1:

In reference to the analysis provided in Chapter IV, organizations whom have the ability and capacity to effectively adopt innovations, avoid the temptation to do so in situations under conditions wherein the innovation is not aligned with its mission or a specified problem identified within the organization.

b. Recommendation 1:

Innovations pursued within DoD organizations should be aligned with the mission of the organization and a specified problem or capability gap (avoid adopting innovations-on-the-loose).

c. Finding 2:

In reference to the analysis provided in Chapter IV, innovations require a period of low-visibility fitting and testing.

d. Recommendation 2:

Prior to reaching the clarifying stage, organizations should conduct seek to properly test and fit the innovation within real-time programs and day-to-day operations (i.e., prototyping). These efforts will enable the organization and its leaders to facilitate subsequent clarifying questions and questions regarding the innovations impact upon the status quo. Many innovations fail due to the lack of clarity surrounding the innovation, as opposed to performance issues. Clarifying the purpose of the innovation will help others within the organization contribute to its implementation.

e. Finding 3:

In reference to the analysis provided in Chapter IV, providing opportunities to re-invent/redefine the innovation and restructure the adopting organization, allows both the innovation and the organization to reap the maximum benefits of the innovation adoption process.

f. Recommendation 3:

Allow organizational members impacted by the innovation to engage in re-inventing and redefining of the innovation. Re-inventing and redefining of innovations is a normal part of the adoption process and ought to be for the purpose of aligning the innovation more closely with the organization's given mission. Likewise, consideration ought to be given as to how the innovation might perform more effectively if the structure or workflow of the organization is altered.

g. Finding 4:

As demonstrated within the Chapter III cases, when provided with strategic-level guidance, innovative organizations aggressively assume innovativeness. They do not always wait for explicit instructions or guidance to innovate, but rather assume innovation as an implicit directive.

h. Recommendation 4:

Many of the ideas and practices espoused by the organizations within the case study, demonstrated a bias for innovation as opposed to adopting innovations as result of directives. Although directives and other strategic-level communications provide the basis of an organization's mission and objectives, innovation must be assumed in how those objectives are carried out. For example, DIUx's CSO was designed to comply with the legislative requirements of 10 U.S.C. §2371(b), however it assumed an innovative approach quite different from other institutions which have used the same authority.

i. Finding 5:

Innovative talent need not always be recruited, but can be harnessed within the organization. For example, the DIUx workflow and organizational capacity to integrate commercial business practices further harnessed my innovative thinking and overall approach to project management.

j. Recommendation 5:

In addition to identifying characteristics which cause individuals to behave and think innovatively, DoD can identify values which drive innovation at the organizational-level. The organizations which can be observed exists within, but also beyond the commercial sector. Organizations such as RAND Corporation, DARPA, NASA, and DIUx provide past and present examples of innovations within organization. Figure 6 provides a brief comparison of values espoused by the RAND Corporation during the 1940s and 50s and those of DIUx.

Outlier Values	RAND	DIUx
Mission Perspective	Enhancing decision-makers	Accelerates commercial innovation to the warfighter
The Value of Autonomy	Shared sense of compelling goals makes autonomy possible	PMs integrate with DoD customers to discover and solve large-scale problems
Collaboration	Combinatoric Discovery	Collaboration is designed around key decisions within major project workflow
Overarching Organizational Culture	Outside-the-box-thinking and a tolerance for independent ideas	Rapid innovation and project execution; non-dilutive venture capital; technology start-up

Figure 6. Comparative Outlier Values. Adapted from Augier et al. (2015) and DIUx (2107).

B. SUMMARY

This research was designed to extend the discussion regarding the DoD's integration of innovations at the organizational-level. During the course of research, I addressed key issues surround the process of adoption, including several nuances associated with this process. The overall objective of this research was to identify how the adoption of innovative concepts, methodologies, and technologies be better understood and leveraged within DoD organizations. Chapter I introduced the concept of innovation

adoption and further described innovation within context of national defense. Chapter II provided a review of literature surrounding the topic of innovation adoption and the nuances associated with its conduct within DoD and other organizations. Additionally, Chapter II introduced the Five Stages Model for innovation adoption within organizations. Chapter III presented short cases on the DoD's adoption of other transaction authority as a means to construct innovative purchase agreements. The organizations covered within the cases represent those pivotal in the DoD adoption and implementation of OTA. Chapter IV provided an analysis of the cases presented within Chapter III using key themes extracted from the literature review. Chapter V identifies key findings and recommendations stemming from the analysis.

Although the process of adopting innovations will likely differ across organizations, there does exist a broad-level of applicable lessons learned from organizational successes and failures. In the final sections of this chapter, I will provide lessons learned as a result of my research and offer recommendations for future research.

C. LESSONS LEARNED

Adopting innovations within any organization is undoubtedly a complex endeavor and difficult to achieve; however, the literature surrounding the topic affirms that DoD organizations possess a few unrealized advantages within the adoption process. For instance, several DoD organizations are accustomed to identifying capability gaps within their organizations. As identified in the previous chapters and highlighted within the recommendations, innovation adoption is often initiated by the identification of an organization's problems or capability gaps. These problems and gaps represent potential opportunities for organizations to initiate innovative solutions. Successful adoptions of innovation are often characterized by the ability to link problems and capability gaps with the innovation. Next, DoD organizations are accustomed to mission-focused operations. This particular characteristic helps drive the agenda-setting process, enabling organizations to quickly identify what problems to prioritize. Finally, DoD organizations face an ever-changing enemy and operational landscape. Because of this, there continues to exist an abundance of opportunities to adopt new ideas, methods, and technologies.

D. FUTURE AREAS OF RESEARCH

Future areas of study may include the application of the Five Stages Model to other innovation adoption cases within DoD organizations. At this present time, the adoption of technologies, operating concepts, and policy distinctly related to the various domains of warfare would provide an interesting avenue of approach to further apply the model. Additionally, as the DoD commissions more organizations with innovation-related missions, the model can be used to further strengthen the adoption process within these organizations. Finally, as DoD's learning institutions play a significant role in officer development, education, and training, I suggest that the subject of innovation—especially as it relates to innovative acquisition, contracting, and agreement mechanisms—be included in the appropriate curriculum.

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