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Examining the Critical Success Factors of Rapid Acquisition: A Human Capital Perspective

Christine J. Jestice

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**EXAMINING THE CRITICAL SUCCESS FACTORS OF RAPID ACQUISITION:
A HUMAN CAPITAL PERSPECTIVE**

THESIS

Christine J. Jestice, 1st Lieutenant, USAF

AFIT-ENV-MS-19-M-180

**DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY**

AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

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A HUMAN CAPITAL PERSPECTIVE

THESIS

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In Partial Fulfillment of the Requirements for the
Degree of Master of Science in Engineering Management

Christine J. Jestice, BA

1st Lieutenant, USAF

March 2019

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A HUMAN CAPITAL PERSPECTIVE

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Abstract

Department of Defense (DoD) acquisition programs continue to encounter schedule delays and cost overruns despite past reforms. Global threat uncertainties and high-velocity technological advances are also prevailing. Given the current rate at which program offices are fielding weapon systems, the United States (US) may be fighting with obsolete weapons and technology. Gaining superiority demands a new approach – to expedite the rate of capability delivery through rapid acquisition programs who have demonstrated success in delivering capabilities with speed.

This research examines whether the attributes in the *people* dimension of an expedited framework contribute to success of rapid defense acquisition programs. Through standard statistical techniques, this research finds the following nine attributes—autonomy and empowerment, customizable team, SME in traditional acquisition process, retention of good talent, customer involvement, tangible connection, motivated culture, debrief culture, and government technical competence—are critical to success of rapid programs. Out of those factors, retention of good talent, debrief culture, and autonomy and empowerment emerge as the best predictors for rapid programs. This research also finds that the attributes autonomy and empowerment, retention of good talent, and motivated culture are embodied by rapid programs but not by traditional (non-rapid) programs.

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Christine J. Jestice

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EXAMINING THE CRITICAL SUCCESS FACTORS OF RAPID ACQUISITION: A HUMAN CAPITAL PERSPECTIVE

I. Introduction

Background

The Department of Defense (DoD) acquisition community has undergone numerous reforms since DoD Acquisition was institutionalized (Brown, 2005). The evolution of DoD Acquisition to present day has been attributed to these reforms (Brown, 2005). Because World War II produced superior weapons such as the atomic bomb, it was believed the next war would exploit far more technological advances. Therefore, the quest for greater innovations became more pronounced, impacting acquisition policies, structures, and processes (Converse, 2005). The need to be technologically dominant as a result of the Soviet Union's successful demonstration of nuclear testing and launching of Sputnik I ahead of the United States (US) space program impacted acquisition processes by generating unrealistic requirements on bombers, causing schedule delays (Converse, 2005). The DoD permitted concurrent development and production of some systems to mitigate these delays (Converse, 2005).

The pursuit of technological advances also worsened inter-service conflict (Converse, 2005). This created the Reorganization Act in 1958, which centralized acquisition management to the Office of the Secretary of Defense (OSD) (Converse, 2005). Secretary of Defense (SecDef) Robert S. McNamara took advantage of the Reorganization Act as evidenced by a series of creation and reform of acquisition policies and processes. He bequeathed the budgeting system, presently known as the Planning,

Programming, Budgeting, and Execution (PPBE), and the five-year defense plan (FYDP), and also placed emphasis on fixed-price contracts (Poole, 2005), to name a few.

However, underneath all the relatively successful reforms, DoD acquisition neglected to fully perceive the impact of technology (Poole, 2005) as it was living in its “happy bubble,” a phenomenon whereby organizations remain stagnant after experiencing a huge success (Sutherland & Sutherland, 2014). Similarly, the US leaders did not predict that further technological innovations as noteworthy as that of the atomic bomb or the Minuteman would occur again (Poole, 2005).

The subsequent decades engendered further reforms. As with all the past reforms, Deputy SecDef David Packard continued to focus on the *procedural* aspect of acquisition programs and the *practice* of weapons development and production in his May 1970 policy memorandum (Ferrara, 1996). Nevertheless, through the Blue Ribbon Commission, Packard confronted the subject of *people* (Brown & Moody, 2005) that other reforms have not formally addressed in the past. The policymakers continued to institutionalize reforms through the ensuing years via the application of the Blue Ribbon Commission. These reforms vastly concentrated on modifications to statutory and regulatory policies such as consolidation of 50 directives, creation of procedures for acquisition reports, and new guiding principles on innovation) (Ferrara, 1996).

The acquisition community witnessed a radical shift in the early 2000 not only as a result of the September 11 attack but due to Donald Rumsfeld’s second appointment as the SecDef. Former SecDef Rumsfeld had high proclivity to use technology and his pronounced antagonism to bureaucracy and policies -- so much so that he cancelled the 31-year old acquisition policy (Shiman, 2005). He advocated for flexibility in program

management and evolutionary acquisition, whereby systems were initially fielded with less capabilities and upgraded in a progressive and incremental manner (Shiman, 2005). While his way might have been more appealing to the workforce than any other reforms, the 2005 Defense Acquisition Performance Assessment determined that more reforms were necessary (Eide & Allen, 2012). Further reforms that were enacted in the post-Rumsfeld era are the Weapon Systems Acquisition Reform Act and Efficiencies Initiative (Eide & Allen, 2012).

Accompanying these overhauls are uncertainties in threats and rapid technological changes that the acquisition community continually faces. Global threats have become unpredictable and technology is moving at a dangerously rapid rate (DoD, 2001). As Secretary of the Air Force (SecAF) Heather Wilson articulated, our “adversaries are modernizing and innovating faster than we are” (Stanley, 2017, para. 11). Gone are the days when the Government Accountability Office (GAO) reported that “the weapons that [DoD] develops have no rival in superiority” (United States General Accounting Office, 2003, 2004, 2005, 2006). According to the Air Superiority 2030 Flight Plan, the US may not be able to match the capabilities of its adversaries and potential adversaries (Enterprise Capability Collaboration Team (ECCT), 2016). Traditional threats will continue to multiply concurrently with advanced aircraft and weapons (ECCT, 2016). Given the rate at which most acquisition program offices are delivering weapon systems at present, the US may be fighting with obsolete weapons and technology. Simply put, gaining and sustaining air superiority demands a new approach (ECCT, 2016). It is then logical to hasten the rate at which the capabilities are being delivered to the warfighters as current acquisition practices remain static in today’s dynamic world (DoD, 2018).

While DoD acquisition has practiced and continues to practice rapid weapon systems development and fielding by means of exploiting non-traditional acquisition processes, these are only implemented in rarity. More traditional (non-rapid) acquisition programs may be compelled to adopt rapid acquisition for there is a desperate need to “deliver performance at the speed of relevance” (DoD, 2018, p. 10) despite an increasing number of rapid program offices both from the industry and government as well as the adoption of various agile methodologies in both the software and non-software community.

Benchmarking rapid acquisition requires more than procedural changes and “thou-shall-do-this” direction. Once again, previous reforms serve as an attestation that solely changing policies was ineffective. Ironically, DoD acquisition reformer and former SecDef David Packard eloquently expressed this sentiment as written on the Blue Ribbon Commission’s final report to President Reagan.

Excellence in defense management will not and cannot emerge by legislation or directive. Excellence requires the opposite—responsibility and authority placed firmly in the hands of those at the working level, who have knowledge and enthusiasm for the tasks at hand. To accomplish this, ways must be found to restore a sense of shared purpose and mutual confidence among Congress, DoD, and industry. Each must forsake its current ways of doing business in favor of a renewed quest for excellence. (1986, p. xii)

Organizations throughout the world often target changes to processes and products at the expense of people (Perry, Staudenmayer, & Votta, 1994). This makes sense because the former are tangible items such that changes are more measurable (Perry et al., 1994) and discernable. It is also simpler to apply changes to processes and

products than people. People are, after all, already a convoluted bunch. Perhaps, this is one reason why there are less studies on the human element (Perry et al., 1994), but on the contrary, humans' complexity, criticality, and dominance (Perry et al., 1994) in every organization are even more motivation to place greater emphasis on social context studies.

Accordingly, this research will examine the *people* dimension of organizational practices in rapid acquisition programs. Like every organization, rapid organizations embody attributes that make them unique. An extant technical report identifies particular elements of this type of organization (Lepore et al., 2012). In collaboration with the Air Force Institute of Technology and University of Southern California, Stevens Institute of Technology's Systems Engineering Research Center (SERC) developed an all-encompassing product of their study's findings, recommendations, and observations—the Research Topic 34 (RT-34) Expedited Systems Engineering (SE) Framework. This framework categorizes each element in terms of organizational, business/leadership, and cultural best practices and sub-categorizes organizational best practices into people, process, and product. This research will be based on the observations on *people* practices that Lepore et al. (2012) discovered in their study:

1. Build and maintain trust
2. Populate team with specific skills and experience
3. Maintain high levels of motivation and expectation
4. Government team leads the way

Problem Statement

The National Defense Strategy (NDS) (2018) identified the following as one of its objectives: “continuously deliver performance with affordability and speed as we change Departmental mindset, culture, and management systems” (DoD, 2018, p. 4). One approach is to uncover attributes of organizations who have demonstrated success in achieving the above objective and normalize ways in which many traditional acquisition units operate through the enumerated attributes in the previous section. While this approach had already been executed by Lepore et al. (2012), one limitation to their research was the questionnaires, face-to-face interviews, and observations were designed with the assumption that the resulting attributes directly influenced success of rapid programs. Thus, the RT-34 Expedited SE Framework requires further refinement by assessing whether each attribute is a contributing factor to a rapid acquisition program’s success. This assessment will be one step closer toward attaining the NDS objective.

Research Objective and Focus

The purpose of this study is to assess the attributes of the RT-34 Expedited SE Framework and ultimately determine the critical success factors of an Air Force (AF) rapid acquisition program. While the expedited framework explored organizational practices of people, process, and product, this research places emphasis solely on the human capital dimension of the organization.

Investigative Questions

The researcher seeks to answer the following questions:

1. Which attributes of the RT-34 Expedited SE framework are contributing factors to the success of a rapid acquisition program?
2. Out of the resulting critical success factors, which factors are not embodied by non-rapid (traditional) programs?

Methodology

Lepore et al. (2012) interviewed individuals at the headquarters and program level from 25 government rapid acquisition offices. This research expanded its target participants to the lowest level of each organization, down to the members of the Integrated Product Team (IPT). In contrast to Lepore et al. (2012) who surveyed intelligence communities and academic institutions in addition to rapid organizations, this research limited its participants to those under the umbrella of Air Force Life Cycle Management Center (AFLCMC). AFLCMC was chosen because (1) It is an all-encompassing center responsible for weapon systems management from cradle to grave (88th Air Base Wing Public Affairs, 2018), (2) It comprises both rapid (or organizations that operate under rapid acquisition authorities) and non-rapid system program offices (SPOs), and (3) Approval to conduct a survey on AFLCMC directorates can be easily and promptly acquired because this research is sponsored by the deputy commander of AFLCMC (AFLCMC/CV). Data was collected through a Common Access Card (CAC)-enabled online questionnaire system, which was accessible from a government or personal computer. Most questions utilized a 7-point Likert scale (Taylor & Bowers, 1972) with the exception of one which used a rating scale. Demographic information was collected anonymously. Standard statistical techniques were used for data analysis.

Preview

This research aims to refine the RT-34 SE Expedited Framework. The framework was formed with the assumption that the attributes of the surveyed rapid acquisition programs resulted in success. As a follow-on research, this study will examine whether the elements in the *people* dimension of the framework are contributing factors to success of a rapid acquisition program. In addition, this study will ascertain whether there are critical success factors that traditional acquisition programs do not embody. The results will be presented to AFLCMC to be utilized for further validation and/or implementation on a traditional DoD acquisition program.

The next chapter provides more details on the RT-34 SE Expedited Framework and explores extant literature on the critical success factors within the *people* dimension. Chapter III introduces this research's experimental design, which includes but is not limited to data collection and test subjects. Chapter IV itemizes the hypotheses and reveals the results of the statistical analysis. Finally, Chapter V conveys the interpretation of results, the answers to two research questions, and topics for future research.

II. Literature Review

Chapter Overview

The purpose of this chapter is to explore the critical factors that positively contribute to a rapid acquisition program's success. The definition of success is discussed in this chapter. This chapter details the observations and findings of the research conducted by Lepore et al. (2012). While this research utilizes *rapid* to distinguish from *traditional* project management, there is an abundance of synonymous nomenclature used by the government and industry. Consequently, these terms were exploited for extant literature evaluation and is addressed in the subsequent section. The next section reviews the nine elements of success and findings from literature on the attributes developed by the RT-34 SE Expedited Framework. Finally, the chapter concludes with the list of research hypotheses.

Research Topic 34 Expedited SE Framework

This research extends the grounded theory-based study by Lepore et al. (2012). Both studies aim to enhance the current acquisition process and to sustain competition against technology and our adversaries. While Lepore, et al.'s general goal was to ascertain contributing attributes to rapid acquisition, they were in search of factors that were directly linked to the SE process (Lepore et al., 2012). In particular, the questions were geared toward processes and products vis-à-vis the V-model of the SE life cycle (MITRE, 2014) and architectural solutions, respectively (Lepore et al., 2012). The outcome of their data collection was quite unexpected as the results were traced to sociocultural elements. It is worth noting that this does not remove or diminish the

weight on processes and products as all three elements work in tandem, but once again, this attests to the significance of the human capital that unfortunately is often overlooked. Figure 1 (Lepore et al., 2012) below illustrates the *people*, *process*, and *product* practices working collaboratively to achieve a rapid framework.



Figure 1. RT-34 Expedited SE Framework

The *people* dimension of the framework generated five observations. For the purpose of this research, the fifth observation was not exploited for data collection and analysis because it was deemed more appropriate under *process* dimension. Each observation, enumerated on the middle column of Table 1, is further decomposed into one or more sub-attributes, better known as critical success factors, as shown on the right column of Table 1. The subsequent paragraphs provide additional information on each observation to elucidate its relationship with the corresponding critical success factors. The critical success factors were not explicitly addressed as such by Lepore et al. (2012) but were selected to represent and capture all the focal themes of the *people* dimension.

	Observations	Critical Success Factors
1	Build and maintain trust	Autonomy and empowerment
2	Populate team with specific skills and experience	Customizable team
		Subject Matter Expert (SME) in traditional acquisition process
		Retention of good talent
3	Maintain high levels of motivation and expectation	Customer involvement
		Tangible connection
		Motivated culture
		Debrief culture
4	Government team leads the way	Government technical competence

Table 1. RT-34 Expedited SE Framework Observations and Critical Success Factors within *People* Dimension

Lepore et al. (2012) provided further attributes which implicitly implied trust as an inherent factor in, or perhaps enabling factor to, the magnified attributes. Trust facilitates the birth and growth of a solid relationship among members of the team (Lepore et al., 2012). The presence of trust provides a sense of empowerment to make decisions at all levels of leadership whereby junior leaders are as empowered as senior leaders in rapid organizations (Lepore et al., 2012). As bureaucracy, which has been regarded as a hindrance to DoD acquisition, is the antithesis to empowerment, Lepore et al. (2012) identified the latter as a success factor to rapid acquisition. Where bureaucracy personifies several layers of authority, empowerment is the clout that lessens these layers. It follows, then, that empowerment delivers autonomy in the decision-making process for

program managers and engineers. Akin to trust, autonomy and empowerment is not simply given in rapid organizations but rather, is earned (Lepore et al., 2012).

Lepore et al. (2012) found having the ability to personally select members of one's team is conducive to a program's success. In a perfect world, a leader has the ability to personally select her team with the right education, experience, abilities, and personality. This is an arduous or more likely an impossible task because the need of the Air Force (AF) does not equate to finding the right skill set. However, rapid organizations utilize techniques to combat these challenges such as leveraging strengths of one another to make up for absence of specific skills and increasing knowledge in areas that are specific to the program (Lepore et al., 2012). Lepore et al. (2012) also identified having extreme depth of knowledge in traditional acquisition as a success factor. Knowing which sections of applicable policies to tailor enables rapid organizations to design a strategy and meet a program's needs (Lepore et al., 2012). The final success factor for the second observation is retention of "great talent" (Lepore et al., 2012) in a specific program office. Current practice for AF active duty acquisition members is a Permanent Change of Station (PCS) every three years or every four years provided the member moves to a different local unit after two years. Some would argue against this practice because there may not be sufficient time for mastery.

Lepore et al. (2012) observed rapid program personnel embodied a motivated and enthusiastic attitude. This motivation is attributed to having a strong relationship with users. Regular communication with customers and users¹ delivers a direct connection to

¹ For the sake of simplicity, customers and users will be collectively referred to as stakeholders from this point forward.

the operational world (Lepore et al., 2012). In turn, the interaction between the acquisition and operational community become personal such that the operational users are no longer an object (versus a person) on documents to acquisition managers. Stakeholders are highly engaged in the acquisition process as well. Lepore et al. (2012) also gives credit to the ability to witness a program transition from inception to completion (delivery of capabilities to users). This is a rare occurrence in traditional program offices as it typically takes several years for a program to advance from one milestone to the next. For instance, DoD programs take two years on average to complete and coordinate the required documents for the approval to the successor milestone (Sullivan, 2015). There is a sense of job satisfaction when one sees a visible product as a result of her work (Colquitt, Lepine, & Wesson, 2011). Lastly, rapid programs are less risk-averse than traditional programs because the notion that mistakes do occur is ingrained in the rapid programs personnel's mindset, but repeating mistakes is unacceptable. Furthermore, when mistakes are made, the emphasis is placed on lessons learned rather than placing culpability on individuals.

The awareness that Air Force programs have become too reliant on contractors (Lepore et al., 2012) is an insightful observation because it is representative of the general acquisition community's sentiment. Reliance on contractors, in this context, is expressed as losing technical or experiential competence as characteristically observed in engineers. Engineers have expressed inability to put their academic knowledge to use. A GAO report testified that actual work is generally executed by contractors while military and civilian personnel performed such administrative duties as providing guidance, oversight, and approval (Hutton, 2007). In contrast, personnel from rapid organizations

are the tenant experts on their program (Lepore et al., 2012). Rather than outsourcing acquisition activities to contractors, their capabilities are exhausted first (Lepore et al., 2012). They are expected to be technically conversant regardless of their function in the program office.

Key Terms Description

The advent of *agile* in 2001 engendered many different terms although the intention and objective—to swiftly adapt to a dynamic environment—was relatively similar (Strode, Huff, Hope, & Link, 2012). Lepore et al. (2012) defined *rapid* as fielding a capability to warfighters from inception in two years or less. The difference in various definitions of *capability* depend on the stakeholders and the type of system. Even though Lepore et al. (2012) equated *rapid* to *expedited*, nuances exist between the two. The former is more closely associated with the type of acquisition activity as in *rapid acquisition* while the latter describes a process that incites rapid acquisition as in *expedited systems engineering* (Lepore et al., 2012). One may expect this research to use *expedited* to stay consistent with Lepore et al. (2012), but the AF acquisition community—this study’s population—uses *rapid* more than *expedited*. Examples can be found in DoD Instruction (DoDI) 5000.02, *Operation of the Defense Acquisition* (Undersecretary of Defense for Acquisition Technology and Logistics (USD (AT&L)), 2017) and the Air Force Guidance Memorandum for Rapid Acquisition Activities (Roper, 2018). *Rapid* has also preceded *prototyping* or *fielding*.

For the purpose of this research, a qualitative approach was applied toward the definition of *rapid*. *Rapid* is inserted in the context of a program or project as the

questions centered on the survey participants' program at the time of data collection along with the group dynamics of the respective IPT. Hence, the definition of a *rapid program* is outlined below:

- Formally operates as a government rapid acquisition office
- Is designated as Joint Urgent Operational Need, Urgent Operational Need, Joint Emergent Operational Need, or Immediate Warfighter Need
- Utilizes such acquisition authorities as
 - National Defense Authorization Act for FY 2016, Section 804 for Middle Tier Acquisition
 - Other Transaction Authority
 - Federal Acquisition Regulation, Part 16, Class Justification and Approval

In order to capture most of current literature, many terms that were loosely synonymous to *rapid* were used in the literature search process. Some terms are esoteric to military organizations (e.g., *urgent*) while others were discernibly industry terms (e.g., *entrepreneurial*). Sherehiy, Karwowski, & Layer (2007) found *adaptivity* and *flexibility* as terms that organizations have associated with to manage uncertainties and changes. Clercq & Rius (2007) found an organization's *entrepreneurial* orientation positively affects its personnel's commitment. Entrepreneurial orientation refers to an organization's inclination toward innovation and individual empowerment, and less aversion to risk (Clercq & Rius, 2007). Shanker, Bhanugopan, van der Heijden, & Farrell (2017) studied the mediating effect of innovative work behavior on the relationship between innovative culture and performance. They found that individuals

working in an innovative organization are more likely to engage in innovative work behavior (Shanker et al., 2017).

Agile necessitates more exposition for this research as majority, if not all, of extant literature contains this keyword. While the agile framework was initially instituted for software development (Beck et al., 2001), its application has since gained popularity in non-software realms such as acquisition activities. Therefore, it comes as no surprise that rapid organizations share common attributes with the agile framework. Table 2 depicts the juxtaposition of RT-34 framework and agile framework.

RT-34 SE Expedited Framework	Agile Manifesto
People making judgments	Individuals and interactions
Motivation and expectation	Motivation and trust
Consistent stakeholders input	Stakeholders collaboration
Debrief culture	Team reflection
Technical competence	Technical excellence

Table 2. Similarities between the RT-34 Expedited Framework and Agile Manifesto

The agile framework highlights individuals over processes as explicitly published in the Agile Manifesto website (Beck et al., 2001). Similarly, the Lepore et al. (2012) observed that the responses of the participants ultimately traced back to *people*. Whether by chance or on purpose, most agile principles seem to center around people or have emerged as a consequence of emphasis on *people*. Projects are created by motivated people in an environment and mindset that exude trust (Beck et al., 2001; Lepore et al., 2012). Furthermore, stakeholders' satisfaction takes priority as evidenced by regular and

frequent meetings with them (Beck et al., 2001), which corresponds to Lepore et al.'s (2012) emphasis on consistent interaction with users as a success factor (Lepore et al., 2012). The agile framework's principle of team reflection for improvement and adjustment (Beck et al., 2001) is analogous to Lepore et al.'s (2012) focused debriefing technique (Lepore et al., 2012). Lastly, everyone is expected to possess technical proficiency to achieve agility (Beck et al., 2001).

Success Criteria

This research utilized nine elements, enumerated below, to measure program success.

1. Schedule (completing work on time)
2. Cost (completing work within budget)
3. Performance
4. Quality of work
5. Services provided to stakeholders
6. Productivity (quantity of work completed)
7. Providing innovative products or services
8. Responding quickly to problems or opportunities
9. Job satisfaction

Program managers throughout the government and industry are responsible for managing the iron triangle of cost, schedule, and performance (Defense Acquisition University).

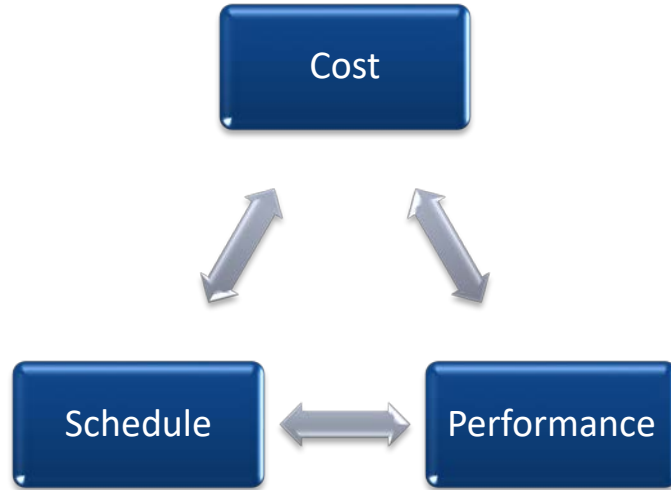


Figure 2. The Iron Triangle

Cost overruns and schedule delays are ubiquitous in DoD projects as evidenced by the use of Earned Value Management System (EVMS) (Verzuh, 2016). Many GAO reports contain terms like schedule delay or cost overrun in terms of progress of projects.

Therefore, it is only logical to include these three elements as criteria to success.

However, measurement of success should not be absolutely limited to cost, schedule, and performance. In fact, depending on the organization, the third element has been supplanted with other dimensions like quality (Atkinson, 1999), functionality (Lech, 2013), and productivity (Coelli, Prasada Rao, O'Donnell, & Battese, 2005). Accordingly, quality was added as another criterion to success. Quality of work, defined as the ability to meet stakeholders' requirements (Nicholas & Steyn, 2017; Steinman, 2017), as well as services provided to stakeholders were included due to their association to stakeholders and the stakeholders' significance in DoD acquisition. Despite the similarities between the fourth and fifth success criteria, the difference lies in the temporal aspect of the

project whereby the former is measured at the end of the project and the latter involves the services between project inception and completion.

Productivity is measured in terms of quantity of completed work from the perspective of government personnel. Szabó (2016) claimed productivity is one area to which organizational goals are related to. Analogously, productivity is to an organization as gross domestic product is to a country in terms of success. In today's fast-paced environment, innovativeness is clearly another way to measure an organization's success (Schilling, 2013; Spiegel, Siegal, Stearn, & Marxt, 2012). This supports Chapter I's narrative, addressing the constant pressure the DoD faces to remain competitive. In fact, Schilling (2013) argues innovation is the most important driver to competition, or in this case, success. While acquisition managers already face enough challenges in their ability to provide innovative products, never mind the inherent complexity in DoD acquisition, problems do not cease there. Problems originate from innumerable sources, and problem-solving skills become vital in this high-velocity world. Atuahene-Gima & Wei (2011) referred to problem-solving skills as the catalyst that quickly transforms input to output, and thus, this research entered the ability to rapidly resolve problems as a success criterion. Finally, this research incorporated job satisfaction because unlike the other eight criteria, job satisfaction employs the most valuable organizational resource—the people—to measure success of an organization. While often unnoticed, the strongest influence on an organization's success are *people* (Haffer & Haffer, 2015).

Critical Success Factors

Four papers were specifically engrossed in applying agile principles to information assurance and cybersecurity (Bellomo & Woody, 2012; Gansler & Lucyshyn, 2012; Northern, Mayfield, Benito, & Casagni, 2010; Porche et al., 2005). Bellomo & Woody (2012) and Porche et al. (2005) provided recommendations on agile methods to attaining cybersecurity certification, which did not make reference to the success factors in Table 1. Gansler & Lucyshyn (2012) expressed challenges in human capital in terms of training, retention, and rotation, but the circumstance was outside the realm of this research. Northern et al. (2010) provided an agile guide for IT systems engineering programs but solely focused on tools and processes. Lapham (2012) tackled the advantages of adopting agile methods within the DoD. She maintained these benefits can be realized by changing some traditional acquisition approach (Lapham, 2012). The cultural elements in her article did not match the critical success factors in Table 1, but research question #2 is an area for future research as it aims to uncover the critical success factors that are uncommon to rapid and non-rapid (traditional) program. Additional details on this topic will be discussed in Chapter V. Dawson (2001) conducted a case study on the influence of acquisition reforms and rapid acquisition to an Army program. While his recommendation included DoD workforce improvement, the document provided inadequate information to support this research. Kennedy & Ward (2012) explored the agile framework in system development, which is only a part of the acquisition life cycle. This research assumes the critical success factors apply to the entire acquisition life cycle. Furthermore, it only covered the business, system, and software aspects of agile acquisition (Kennedy & Ward, 2012).

While the public research databases generated thousands of articles on agile, only a few have exclusively conducted research on critical success factors to rapid programs (Fontana, Fontana, Da Rosa Garbuio, Reinehr, & Malucelli, 2014; Misra, Kumar, & Kumar, 2009; Strode et al., 2012). Of those articles, none took place in a government setting. Instead, the survey participants were software companies in the Information Technology (IT) domain (Jovanović, Mas, Mesquida, & Lalić, 2017; Stankovic, Nikolic, Djordjevic, & Cao, 2013; Stettina & Hörz, 2015). Other targeted domains were manufacturing (Dubey & Gunasekaran, 2015; Yusuf, Sarhadi, & A., 1999), international software companies (Shanker et al., 2017), electronics, telecommunications, aerospace, and oil and gas (Misra et al., 2009).

The remainder of this chapter will explore findings from the critical success factors literature review.

Autonomy and Empowerment

Misra et al. (2009) performed research on globally diverse industries such as manufacturing, electronics, and aerospace who exercise agile software development (ASD) in an effort to identify the enabling factors for agile adoption. Their study found swift decision-making skills increase the likelihood of success of ASD-specific projects. In fact, decision time was found to have a strong correlation with success. Rapid decision-making skills are positively related to autonomy and empowerment because empowered leaders have the freedom to make decisions without seeking approval from several layers of authority. Therefore, autonomy and empowerment are qualifying factors toward the successful adoption of agile.

Gren, Torkar, & Feldt (2017) conducted a qualitative research on agile-practicing organizations to ascertain the relationship between the dynamics of an agile team and group maturity. Theoretically, a more mature group yields better performance, and agility increases the likelihood of project success. Their study aimed to put this theory into practice for there is a dearth of research work on the psychological aspect of a team. Additionally, Gren et al. (2017) found an increase in job satisfaction as a result of adopting agile. During the open-ended interview, some participants attributed this positive result to autonomy.

Tripp, Riemenschneider, & Thatcher (2016) surveyed over 250 software development workers to determine which attribute of agile methods increase one's job satisfaction. Using statistical analysis, the researchers found employees who perceive the presence of autonomy positively affect their job satisfaction. The use of agile practices from a programmatic perspective also creates a positive impact on job autonomy. The latter is supported by the assertion that workforce empowerment is an attribute of agility (Tsourveloudis & Valavanis, 2002; Yusuf et al., 1999).

Customizable Team

Akin to this research's objective, Chow & Cao (2008) explored critical success factors that will aid in the success of ASD projects. They highlighted the value of people in projects by listing the following success elements: (1) competent and expert members; (2) knowledgeable in agile process; and (3) adaptive leader. The three elements were then reconciled to "high-caliber team capability" (Chow & Cao, 2008) as the hypothesis

was formed. Their research revealed that team capability is a critical success factor with respect to schedule and cost.

Chow & Cao (2008) found that having the right people is instrumental to success of an ASD project. Chow & Cao (2008) further defined “having the right people” as one who possesses the quality of readiness to learn and collaborative attitude. While these qualities do not exactly equate to *customized team*, Lepore et al. (2012) subsumed the ability to enrich one’s skill and to take advantage of team members’ strength under team personalization.

Tsourveloudis & Valavanis (2002) sought to develop a quantitative framework that measures and evaluates the agility of a manufacturing company. The paper did not exclusively address success factors, but notwithstanding, it expressed knowledge, skills, and experience as key parameters to agility. Training through education and cross-training has been utilized to measure the agility level indicator of an organization for their research. Yusuf et al. (1999) also conducted an exploratory research on enablers to agility in manufacturing companies. They found “learning organization, multi-skilled and flexible people, workforce skill upgrade, and continuous training and development” as key qualities of an agile organization. Dyer & Shafer (2003) asserted that personnel must constantly aspire to improve their knowledge and skills to achieve and maintain agility.

In his research project at Army War College, Colonel Joseph Roberts (2017) recommended the need for “highly qualified staff members.” Further, rapid organizations should not be the first assignment for new acquisition officers. His observation of the power to choose team members from each function (Roberts, 2017)

agrees with that of Lepore et al. (2012). The sense of urgency is certainly visible with experienced staff.

During their study to determine whether the degree of effort in agile planning is linked to success, Serrador & Pinto (2015) found that team experience is not a significant moderating variable between agile planning and project success. In other words, agile planning remains a predictor of project success without the presence of experienced team members.

Subject Matter Expert in Traditional Acquisition Process

Traditional acquisition in this context alludes to the 154-page document that establishes management of DoD acquisition programs (USD (AT&L), 2017). Thus, the literature search expectedly did not generate results concerning traditional acquisition SMEs. While customizing a program according to its needs (Lepore et al., 2012) could generate a different interpretation (e.g., expressed as creative), creativity simply does not fit in the context. The ability to tailor the acquisition process to fit the needs of the program is a product of having profound knowledge in the traditional acquisition process. This critical success factor strictly pertains to, as the name indicates, experts in traditional acquisition.

Retention of Good Talent

De Melo, S. Cruzes, Kon, & Conradi (2013) conducted a study on three large software companies in Brazil to determine the effect of agile practices to productivity. Through interviews, they found staff turnover was negatively related to productivity, although staff turnover was not quantified.

As mentioned previously in the *Autonomy and Empowerment* section, Gren et al. (2017) explored the relationship between group dynamics and group maturity in an agile team. Group maturity relates to retention of personnel because the longer an individual is committed to one organization, there is evidently more opportunity for the group to collectively develop and influence one another and mature. Performance, a measure of success, has a direct relationship with group maturity such that a more mature group is said to perform better (Gren et al., 2017).

Augustine et al. (2009) conducted an extensive examination on defense acquisition process as a non-partisan organization. Among all other findings, inexperienced and constantly rotating acquisition employees was deemed a detriment to acquisition success (Augustine et al., 2009). In fact, Augustine et al. (2009) recommended that key personnel remain in place until the current milestone is complete.

Customer Involvement

Out of the nine critical factors, operation-focused yielded the highest results. This makes sense because operation-focused pertains to stakeholder involvement, which is omnipresent in various literature as a contributing attribute to an organization's success. In terms of scope (i.e., meeting requirements by stakeholders), Chow & Cao (2008) gleaned data from 109 agile projects from over 25 countries. Their study sought to test the value of critical success factors from five dimensions—organizational, people, process, technical, and project—to an agile organization. Their findings state that a strong stakeholder involvement is indeed a critical success factor to an ASD project and

was ranked second in terms of its relative impact to success. The technical factor was the most contributing factor to success.

Mistra et al. (2009) tested their hypotheses on stakeholder satisfaction, stakeholder collaboration, and stakeholder commitment to ascertain its success-enabling tendency. All three were found to be directly and positively related to success such that the greater the satisfaction, collaboration, and commitment of stakeholders in projects, the greater the chance of succeeding. Out of the three factors, stakeholder commitment had the strongest relationship to success. It is worth mentioning that stakeholder satisfaction was practiced by respondents in approximately 97 percent of the cases.

Through grounded theory, Hoda, Noble, & Marshall (2011) surveyed 16 ASD organizations in New Zealand and India to address the significance of stakeholder involvement in agile projects and the influence of stakeholder to these projects. Despite its prominence, stakeholder involvement remains a challenge to organizations. The researchers found that lack of customer involvement stem from skepticism, distance, lack of time commitment, large customer base, and fixed contracts. These challenges affect the area of requirements, obtaining stakeholder feedback, and loss of productivity.

Dingsøy, Moe, Fægri, & Seim (2018) conducted a case study on a large ASD organization to address the utility and efficacy of agile methods to a large organization. Their findings agree with the abovementioned literature in that a weak stakeholder involvement is not efficacious in large organizations who plans to exploit agile. In addition to active stakeholder commitment, they heeded the importance of stakeholders not being able to lose sight of the organizational mission. This is especially relevant to DoD-like organizations filled with multiple stakeholders who have different priorities. It

briefly addressed the effect of geographically separated units within a large organization, another characteristic of DoD organizations, on stakeholder involvement to be used for further research.

Holzmann & Panizel (2013) investigated the relationship between success and communication between project managers and stakeholders, and the quality of communication between the two parties. As with other literature, their research surveyed IT organizations who were in the process of adopting an agile method. The success criteria were meeting schedule, budget, and requirements as well as stakeholder satisfaction and core competencies. Their study found that communication between project managers and stakeholders are positively related, and the relationship is stronger when communication is executed in person. The results were moderate, which they believe is attributed to external variables.

Kaleshovska, Josimovski, Pulevska-Ivanovska, & Janevski (2015) focused their research on Scrum, one of many agile methodologies, and its impact to success of an organization. Scrum contrasts the waterfall method in that it utilizes incremental product delivery and welcomes changing requirements throughout the project. Due to the iterative nature of this framework and the flexibility it affords, stakeholder involvement becomes a dominant factor. Consequently, their study affirms the hypothesis that lack of user involvement is a root cause of a software organization's failure.

Clowney, Dever, & Stuban (2016) studied the factors that have led to program failures in the DoD. The researchers surveyed DoD program managers, defense industry program managers, and DoD consultants who possess at least 5 years of experience. Stakeholder engagement and its relative status among other factors were examined.

Stakeholder engagement factor ranked fifth from the perspective of DoD program managers, eighth for DoD industry program managers and seventh for consultants. The rankings for industry PMs and consultants are not startling because stakeholders typically interface with DoD program managers. The DoD program managers placed schedule, budget, and scope in the top three. These results are expected as the cost, schedule, and performance triad is ingrained in every DoD program managers (Defense Acquisition University).

Tripp et al. (2016) assessed the impact and causal factors of agile practices to one's job satisfaction. The researchers used a job characteristics model to understand the influence of agile to job satisfaction. It found that higher perceptions of task significance—the degree to which the job has an extensive impact on people (Colquitt et al., 2011)—is indeed positively related to job satisfaction. Task significance relates to this specific section because *operation-focused* also embraces one's connection to an operational group (Lepore et al., 2012).

Augustine et al. (2009) provided their expert observations and recommendations on the defense acquisition process. Their observations and those of Dingsøyr et al. (2018) are alike because both credit the well-intentioned alignment of stakeholders' priorities to the grander organizational objective to the success of DoD programs. They claimed such procedural contexts as lack of accountability, incentive, and consequences are a few causal factors of misalignment of interests, which are beyond the parameters of this research but are areas for future research.

Serrador & Pinto (2015) utilized the perception of program managers on their organization's success to examine the effects of an agile framework. It investigated the

capacity to focus on mission as a moderator variable to the relationship between agile practices and project success. Mission-focused is the ability of an organization to align the project with the larger scheme – the objective of the organization. They found being mission-focused is only slightly significant as a moderator.

Tangible Connection

As stated in the earlier subsection, Tripp et al. (2016) examined the relationship between agile methodologies and job satisfaction through the lens of software development practitioners. Tripp et al. (2016) addressed task identity, the degree to which one is able to experience the transformation of a hypothetical object to a concrete product. Tripp et al. (2016) found significance between the relationship of task identity in ASD projects and their success. Task identity was found as a significant mediator variable as well.

Unfortunately, there is a paucity of literature on the impact of tangible connection to a project's success. This was anticipated because the literature search results generated agile-related articles. Because agile methodologies advocate for routine incremental delivery, being able to see a finished product becomes germane. On the contrary, this is not the case for government personnel because extremely complex weapon systems take years to complete.

Motivated Culture

It is interesting to note the lack of literature on motivation because motivation is widely known to positively affects one's job performance (Colquitt et al., 2011).

However, as a reminder, the literature search and review process concentrated on finding

critical success factors collectively. While motivation is deemed a success factor, it is possible that there are more pertinent factors than motivation within this research setting.

Debrief Culture

The only pertinent literature for this factor was written by Carnegie Mellon University's Systems Engineering Institute, a federally funded research and development center. Lapham et al. (2011) explored the cultural facet of agile and cited "frequent retrospectives to improve practices" as an agile cultural element. "Lessons learned" is commonplace in agile methodologies as it is integrated into every iteration. Lessons learned is what enables agile the flexibility to welcome changing requirements.

Government Technical Competence

Lindvall et al. (2002) claimed competent and experienced people are fundamental players to a successful agile software development project. Specifically, they defined competent as one who has practical experience in a specific domain, akin to a SME. However, Chow & Cao (2008) found a more technically competent person does not make a significant difference in the success of an organization.

The other piece of this factor focuses on, as the name suggests, government employees leading DoD programs. GAO has recognized the problem of high dependence on contractors. Similar to *motivated* and *debrief culture*, extant literature is lacking.

Hypotheses for Research Question #1

This research developed 81 total hypotheses for research question #1. Each of the nine independent variables is theorized to have a positive relationship with nine

dependent variables. The research hypotheses were examined and validated using the data collected from 171 respondents.

1. **Hypothesis 1 (H1):** The presence of autonomy and empowerment is positively related to a) completing work on time; b) completing work within budget; c) overall performance; d) quality of work; e) services provided to stakeholders; f) productivity (quantity of work); g) providing innovative services or products; h) responding quickly to problems or opportunities; i) job satisfaction.
2. **Hypothesis 2 (H2):** The presence of a customizable team is positively related to a) completing work on time; b) completing work within budget; c) overall performance; d) quality of work; e) services provided to stakeholders; f) productivity (quantity of work); g) providing innovative services or products; h) responding quickly to problems or opportunities; i) job satisfaction.
3. **Hypothesis 3 (H3):** The presence of a SME in the traditional acquisition process is positively related to a) completing work on time; b) completing work within budget; c) overall performance; d) quality of work; e) services provided to stakeholders; f) productivity (quantity of work); g) providing innovative services or products; h) responding quickly to problems or opportunities; i) job satisfaction.
4. **Hypothesis 4 (H4):** The presence of retention of good talent is positively related to a) completing work on time; b) completing work within budget; c) overall performance; d) quality of work; e) services provided to stakeholders; f) productivity (quantity of work); g) providing innovative services or

products; h) responding quickly to problems or opportunities; i) job satisfaction.

5. **Hypothesis 5 (H5):** The presence of customer involvement is positively related to a) completing work on time; b) completing work within budget; c) overall performance; d) quality of work; e) services provided to stakeholders; f) productivity (quantity of work); g) providing innovative services or products; h) responding quickly to problems or opportunities; i) job satisfaction.
6. **Hypothesis 6 (H6):** The presence of tangible connection is positively related to a) completing work on time; b) completing work within budget; c) overall performance; d) quality of work; e) services provided to stakeholders; f) productivity (quantity of work); g) providing innovative services or products; h) responding quickly to problems or opportunities; i) job satisfaction.
7. **Hypothesis 7 (H7):** The presence of a motivated culture is positively related to a) completing work on time; b) completing work within budget; c) overall performance; d) quality of work; e) services provided to stakeholders; f) productivity (quantity of work); g) providing innovative services or products; h) responding quickly to problems or opportunities; i) job satisfaction.
8. **Hypothesis 8 (H8):** The presence of a debrief culture is positively related to a) completing work on time; b) completing work within budget; c) overall performance; d) quality of work; e) services provided to stakeholders; f) productivity (quantity of work); g) providing innovative services or products; h) responding quickly to problems or opportunities; i) job satisfaction.

9. **Hypothesis 9 (H9):** The presence of government technical competence is positively related to a) completing work on time; b) completing work within budget; c) overall performance; d) quality of work; e) services provided to stakeholders; f) productivity (quantity of work); g) providing innovative services or products; h) responding quickly to problems or opportunities; i) job satisfaction.

Figure 3 illustrates a summary of the hypothesized success factors.

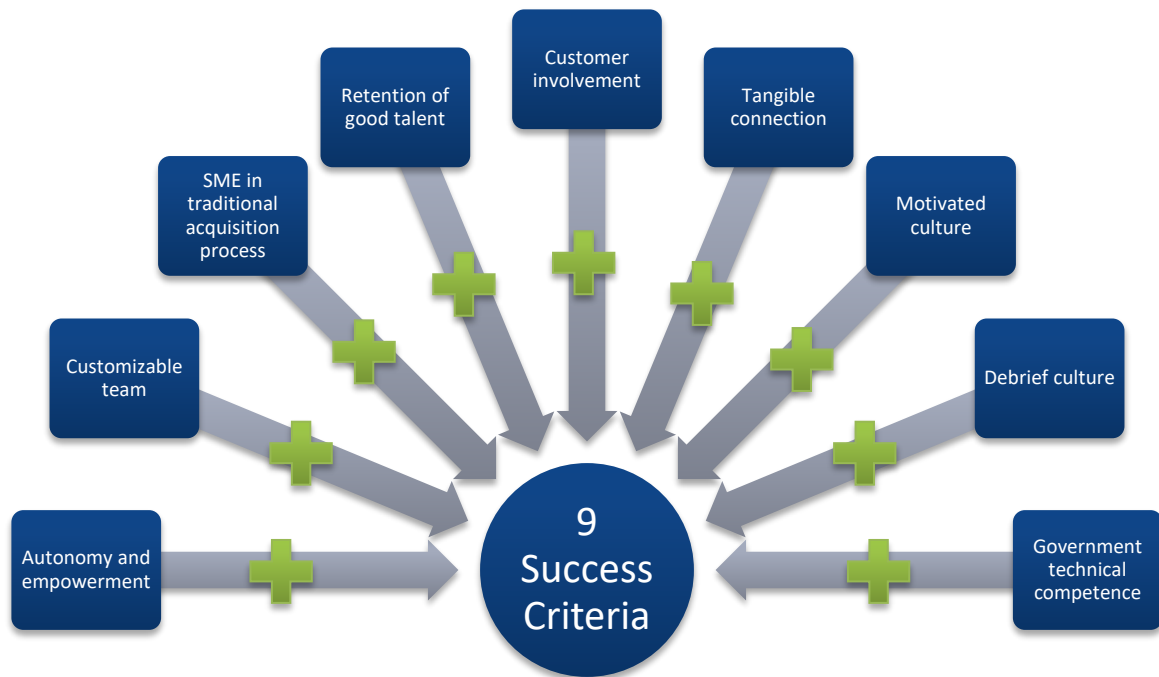


Figure 3. Hypothesized Success Factors

Hypotheses for Research Question #2

Hypotheses 8a – 8i serve to answer research question #2. The research hypotheses were examined and validated using the data collected from 171 respondents.

1. **Hypothesis 8 (H8):** There is a difference in practice between rapid and non-rapid organizations with respect to a) autonomy and empowerment; b)

customizable team; c) SME in traditional acquisition process; d) retention of good talent; e) customer involvement; f) tangible connection; g) motivated culture; h) debrief culture; i) government technical competence

Summary

The literature review was introduced with details on the critical factors of *people* from RT-34 SE Expedited Framework. For clarification, terms that were similar to *rapid* were addressed. The literature search engendered a number of literature on *agile*. As such, a small section was reserved to briefly discuss agile. This chapter also described the success criteria and the motive behind their selection. The next chapter addresses what the criteria are measured against. Lastly, the extant works on nine critical success factors were examined in details.

Most surveyed companies were confined to information technology or software development. While software development appears to be the dominant domain, the DoD has not shied away from the purview of hardware. There are few research that surveyed government organizations, but the objectives were not directly parallel to this research. Further, approximately five articles explicitly captured the influence of critical success factors. On another note, various research studied organizations which are in transition from traditional to agile. This is valuable in providing answers to research question #2. Based on the aforementioned, this research seeks to fill the gap in the following:

- Ascertain which critical success factors apply to a *government* rapid acquisition program

- Define the critical success factors that is embodied by rapid programs but not embodied by non-rapid (traditional) programs
- Provide insight on critical success factors with little to no extant literature:
tangible connection, motivated culture, debrief culture, and government technical competence

III. Methodology

Chapter Overview

The purpose of this chapter is to explain our methodology and research design. This chapter describes the details surrounding the dependent and independent variables. The dependent variables are the success criteria that were explored in Chapter II while the independent variables correspond to the critical success factors that characterize a rapid organization according to the RT-34 SE Expedited Framework. The next section addresses the motivation for the method chosen to measure success. Finally, it provides description of the experimental design, covering test subjects, required equipment, and procedures.²

Description of Dependent and Independent Variables

Dependent Variables

The purpose of this research is to examine whether the attributes from the RT-34 SE Expedited Framework contribute to the success of a rapid acquisition program. This research commissioned nine dependent variables as a form of success measurement. They are indicated below.

² Ethical Oversight: Since data collection necessitated human subject involvement, approval from the Institutional Review Board (IRB) was required as well as completion of an online training through Collaborative Institutional Training Initiative (CITI) program. This research received an approval for exemption from the comprehensive IRB because this non-experimental research utilized survey procedures for which there was minimal to no risk to the respondents. All questions only solicited information vis-à-vis the respondent's acquisition program. Demographics were collected simply for the purpose of conveying the sample's representation. No personally identifiable information was collected or requested. This research was also exempt from a Survey Control Number (SCN) application submittal because approval was easily acquired from the deputy commander of AFLCMC, this research's sponsoring organization.

1. Schedule (completing work on time)
2. Cost (completing work within budget)
3. Performance
4. Quality of work
5. Services provided to stakeholders
6. Productivity (quantity of work completed)
7. Providing innovative products or services
8. Responding quickly to problems or opportunities
9. Job satisfaction

These variables had already been introduced in the previous chapter. Chapter II furnished introductory details as to the researcher's motives for selecting these variables.

This research opted to subjectively measure success through respondent perceptions. With the exception of schedule, cost, and performance, the rest of the dependent variables were difficult to quantify. Some would argue that schedule, cost, and performance could have been easily attained from official project metrics, but doing so would have presented challenges. The response rate may have been lower by adding more questions. Many respondents would have been unwilling or hesitant to share their program's schedule and cost information despite the anonymity of the survey. This is especially true for performance in terms of capabilities delivered or requirements met as they may contain classified information.

The anonymity of the survey should enhance the accuracy of responses. Furthermore, the acquisition community is unsatisfied with the current acquisition process. They want their voices heard, and this survey is one way to do so. Their fervor

was quite evident in their responses as several sent thoughtful comments through e-mail. Even when the online questionnaire was down, which occurred frequently, respondents patiently spent their time informing the researcher of the problem and waited for resolution.

Independent Variables

Designated below are nine independent variables. Lepore et al. (2012) discovered that the 25 rapid organizations they observed and interviewed embody these factors from the perspective of *people*. As an extension of the research by Lepore et al. (2012), this study will still utilize all the *people* success factors even though a few had been previously examined.

The following nine variables emerged as a theme from five *people* observations as reported by Lepore et al. (2012). These observations were then used in the survey as identifying factors or characterizations for each independent variable. For instance, the theme *autonomy and empowerment* characterizes one who is “allowed to make decisions where leaders stand behind these decisions” (Lepore et al., 2012) and also identifies with the notion that “leadership is repeatedly embodied at all levels to allow teams to focus on executing the mission” (Lepore et al., 2012).

1. Autonomy and empowerment
2. Customizable team
3. SME in traditional acquisition process
4. Retention of good talent
5. Customer involvement

6. Tangible connection
7. Motivated culture
8. Debrief culture
9. Government technical competence

Research Design

Test Subjects

Lepore et al. (2012) surveyed 25 government and industry rapid acquisition program office including the intelligence and academic communities. It surveyed individuals at the executive level (i.e., headquarters and program tiers). This research took a different path by extending its target respondents to the lower level at the project level of each organization – to the IPT members. Due to time constraint and the requirement to obtain approval from each organization's commander, this research concentrated its test subjects to personnel from AFLCMC.

AFLCMC was chosen as the sample because it is a comprehensive organization that manages weapon systems across their life cycle (88th Air Base Wing Public Affairs, 2018) and encompasses both rapid and non-rapid (traditional) program offices. AFLCMC employs military, civilians, and contractors with general job titles ranging from program manager to test manager. Some percentage of contractors are retired military acquisition and maintenance officers and enlisted members. AFLCMC's portfolio contains ten directorates, enumerated in Table 3, to which each program office reports.

AFLCMC Directorates
Agile Combat Support
Armament
Business and Enterprise Systems
Command, Control, Communications, (C3I) and Networks
Digital
Fighters and Bombers
Intelligence, Surveillance, Reconnaissance and Special Operations Forces (ISR/SOF)
Mobility and Training Aircraft
Presidential and Executive Aircraft
Tanker

Table 3. AFLCMC Directorates

Experimental Equipment

The research utilized milSurvey, a DoD survey platform, as a vehicle to create an online questionnaire system. milSurvey is one of many embedded applications in the milSuite website. Although milSurvey required a CAC card for entry to the site, the website application was accessible both from network and home computers as long as they were CAC-enabled. Nonetheless, the researcher and respondents encountered shortcomings with milSurvey and milSuite. Firstly, milSurvey was not compatible with Microsoft Edge. This generated inconvenience as newer computers defaulted to Microsoft Edge as their web browser. Secondly, some directorates did not have milSuite on their local network approved list. Therefore, several prospective respondents were

unable to participate. This certainly lowered the response rate. Lastly, respondents encountered time-out issues whereby the survey would close due to inactivity despite absence of inactivity (e.g., respondents have only been taking the survey for a few seconds). Unfortunately, these problems were only discovered through the respondents after informing the research of such issues. No special facilities were required to answer the online questionnaire.

The survey was divided into two sections: main questions and demographics. The survey utilized the seven-point Likert scale (Taylor & Bowers, 1972) on all questions with two exceptions. One question involved ranking the success factors while the demographics section used the checkbox and comment options. The main questions comprised eight questions, and each question contained an average of ten sub-questions. Three questions utilized reverse scoring to eliminate acquiescence from respondents.

To increase reliability, each of the nine independent variables had an average of four questions associated with them. As previously mentioned, these questions were merely identifying factors or characterizations, stated differently, of a particular independent variable. For the sake of consistency, the identifying factors for each independent variable were transcribed from the technical report of Lepore et al. (2012). Each identifying factor was transformed into a question in terms of the degree of a respondent's agreement. The identifying factors were randomly placed out of order to ensure the respondents do not discern any patterns, which may affect their answers.

The questions concerning dependent variables were more direct than the independent variables. Unlike the latter, the former did not contain sub-questions. The

survey asked the respondents to rate the *effectiveness* of their IPT with respect to each dependent variable.

The demographics collected were the respondent's years of acquisition experience, job title (e.g., program manager, engineer, finance, etc.), rank, directorate, and division. The questionnaire also inquired about their supervisory position and whether their current program is formally considered *rapid*. Because the sample set was comprised of rapid and non-rapid organizations, the demographic section required a method that would discern a *rapid* respondent from *non-rapid*. Various AFLCMC program offices are already practicing rapid acquisition under various formal authorities, but there were also program offices who *consider* themselves rapid under some assumptions when, in fact, they are not. To ensure this research captured accurate responses, two questions were developed. The first question directly asked whether the respondent is de facto practicing rapid acquisition under defined terms. The second question contained three sub-questions and utilized a 7-point Likert scale (Taylor & Bowers, 1972). Similar to the main questions, the sub-questions were identifying factors of the term *rapid*, all stated differently. The entire survey underwent various iterations until it was deemed ready and error-free for dissemination. This research did not account for the complexity of each respondent's program.

Survey Procedures

In order to capture as many AFLCMC personnel as possible, the survey link was forwarded to each directorate's Executive Officer in lieu of sending it to the AFLCMC Executive Officer whose distribution list may not have contained new AFLCMC

members. Further, personnel are more likely to open an e-mail from an individual who is closer to their chain of command. It was postulated that some personnel could have deemed an e-mail from an external organization (i.e., the researcher) “junk mail,” leading to deletion of my e-mail.

A preliminary e-mail was sent to all Executive Officers, informing them of the research’s intention and providing the approval message from AFLCMC/CV to conduct the survey. The subsequent e-mail message contained the research’s brief description, its objective, respondent qualification criteria, the survey link, and the researcher’s contact information. A follow-up phone call was performed to ensure all ten Executive Officers received and forwarded the message.

Assumptions

This research assumed the Program Executive Officers (PEOs) for their respective directorate also approved of the survey despite having gained an approval from AFLCMC/CV.

Summary

Nine dependent and nine independent variables were employed for analysis. This study attained an exemption from IRB due to minimal risk to respondents. The test subjects encompassed all personnel from AFLCMC. Military members, civilians, and contractors were qualified to participate, and no minimum acquisition experience was imposed. Data was collected through an online survey, consisting of 18 questions. The survey link was distributed to the respective directorate’s Executive Officers via e-mail.

This research followed a non-experimental, quantitative approach. The next chapter explores the statistical techniques used to arrive at the results.

IV. Analysis and Results

Chapter Overview

Chapter IV finally exploits the methodology described in the previous chapter. A reliability assessment on the main questions and one demographic question was conducted to ensure consistency of the researcher-developed survey. Descriptive statistics of the respondents' demographic data is provided in summary. The next subsection provides the statistical test used and results for research questions #1 and #2. Research question #1 exploited hypothesis testing based on normal statistic and regression testing while #2 utilized one-way analysis of variance (ANOVA). This chapter concludes with a more detailed explanation of the results.

Internal Consistency and Reliability

The internal consistency and reliability of the questionnaire, primarily the main questions, were assessed using Cronbach's Alpha (α). Table 4 lists the reliability measure of each independent variable.

Since this research developed its questions, a high value of α is desired (Patten, 2009). This research used the minimal acceptable α range of 0.7. As Table 4 shows, *retention of good talent, motivated culture*, and the demographic question did not meet the minimum acceptable Cronbach's α . The implications of having low Cronbach's α will be visited later in this chapter.

Independent Variable	Cronbach's Alpha	Number of Questions
Autonomy and empowerment	0.867	4
Customizable team	0.783	5
SME in traditional acquisition process	0.775*	3
Retention of good talent	0.512	3
Customer involvement	0.698	4
Tangible connection	0.742	3
Motivated culture	0.421 ⁺	3
Debrief culture	0.836 [#]	3
Government technical competence	0.761	5
Demographic Question: Is your program rapid?	0.652 ^{&}	3
<p>* Deletion of this independent variable's third sub-question increased its reliability to 0.798. ⁺ Deletion of this independent variable's third sub-question increased its reliability to 0.588. [#] Deletion of this independent variable's second sub-question increased its reliability to 0.859. ^{&} Deletion of the second sub-question increased its reliability to 0.869.</p>		

Table 4. Reliability of Main Questions

While deletion of a question for three variables would increase reliability, the rate of increase is only minimal. The increase in reliability of the *motivated culture* variable has the second highest increase (from 0.421 to 0.588), and since the new Cronbach's Alpha remained less than the acceptable range, deleting it would not have made a significant difference. Therefore, deletion of questions for the affected variables was not executed.

The only question that necessitated deletion of a question is the *is-your-program-rapid* question that employed a 7-point Likert scale. The three sub-questions are written below:

1. My Integrated Product Team operates in a rapid framework.

2. My Integrated Product Team entirely employs traditional acquisition practices.
3. My Integrated Product Team prepensely develops or fields systems in a shortened manner.

As Table 4 shows, deletion of the second sub-question would substantially increase the reliability to 0.869. For this reason and in order to accurately answer research question #2, the second sub-question was deleted. In retrospect, sub-question #2 should have been rephrased due to its ambiguity, or emphasis should have been placed on *entirely* as one could rightfully argue that rapid acquisition still practices traditional acquisition to an extent. The word *prepensely* in sub-question #3 should have also been replaced with a more common term. Sub-question #3 is intended to express that rapid acquisition programs are *designed* to field capabilities in a shortened manner.

Test Subjects Demographics

A total of 171 respondents participated in the survey. The following descriptive statistics should aid in the interpretation of the test results.

- *Acquisition Experience*: It ranges from 0 to 40 years.
 - 0 – 5 years: 30%
 - 6 – 10 years: 20%
 - 11 – 20 years: 22%
 - 21 – 30 years: 12%
 - >30 years: 16%

- *Status:* All types of personnel participated with civilians having the highest participation rate at 61%, followed by contractors at 29% and military personnel at 10%.
- *Supervisor:* Most respondents are in a non-supervisory position at 83%.
- *Function:* Respondents are a mixture of personnel from the main disciplines (i.e., program managers, engineers, finance, logistics, and test managers).
- *Directorates:* All but two directorates participated. The Armament Program Executive Officer granted approval for distribution of the survey to senior officers only, but the participation rate stayed at 0 percent. ISR/SOF Directorate did not participate as well. It is worth mentioning that both directorates subsume system program office that customarily practices rapid acquisition program. This piece will be addressed in Chapter V as a limitation of this research.

Statistical Analysis for Research Question #1

Correlation Coefficient and Significance Testing

The tables in the next three pages display the correlation coefficient and significance of the correlation coefficient among the variables. Tables 5 reveals the correlation and significance between independent variables and shows there is no multicollinearity between the independent variables given the correlation coefficient is less than 0.9 (Franke, 2010). For the remainder of this section, the topic only pertains to Table 6, which displays the relationship between nine dependent and nine independent variables.

This study used Pearson's r correlation coefficient and significance testing of the correlation coefficient. According to Cohen (1992), a correlation coefficient of 0.10, 0.30, and 0.50 respectively represent a small or weak, moderate, and large or strong correlation.

The other part of this analysis involves testing the significance of the correlation coefficient. This research commissioned IBM SPSS Statistics to perform a two-tailed test. This particular hypothesis testing determines whether there is a significant linear relationship or correlation between an independent variable and dependent variable.

There are 81 hypothesis tests with the following null and research hypotheses:

Null hypothesis:

- $H_0: r_n = 0$ where $n = 1, \dots, 81$
- There is not a significant correlation between x_i and y_j where i th = 1st, ..., 9th independent variable and j th = 1st, ..., 9th dependent variable.

Research hypothesis:

- $H_a: r_n \neq 0$
- There is a significant correlation between x_i and y_j where i th = 1st, ..., 9th independent variable and j th = 1st, ..., 9th dependent variable.

The test statistic the p -value, which uses a t -distribution, is as follows.

$$t \approx \frac{r\sqrt{n-2}}{\sqrt{1-r^2}}$$

where $n = 171$. The rejection region is $|t| > t_{\frac{\alpha}{2}}$ where $\alpha = 0.05$. Table 6 contains the p -value for 81 hypotheses vis-à-vis research question #1. Each relationship yielded significance at the 0.05 level.

	AE	CT	SM	RE	CI	TC	MC	DC
Autonomy & Empowerment (AE)								
Customizable Team (CT)	0.701 0.000*							
SME in Acquisition Process (SM)	0.537 0.000*	0.689 0.000*						
Retention of Good Talent (RE)	0.546 0.000*	0.625 0.000*	0.620 0.000*					
Customer Involvement (CI)	0.667 0.000*	0.551 0.000*	0.494 0.000*	0.508 0.000*				
Tangible Connection (TC)	0.635 0.000*	0.565 0.000*	0.561 0.000*	0.570 0.000*	0.738 0.000*			
Motivated Culture (MC)	0.443 0.000*	0.482 0.000*	0.484 0.000*	0.517 0.000*	0.567 0.000*	0.554 0.000*		
Debrief Culture (DC)	0.737 0.000*	0.682 0.000*	0.570 0.000*	0.512 0.000*	0.587 0.000*	0.627 0.000*	0.450 0.000*	
Government Team Leads (GT)	0.641 0.000*	0.736 0.000*	0.735 0.000*	0.595 0.000*	0.550 0.000*	0.551 0.000*	0.509 0.000*	0.640 0.000*
Pearson <i>r</i>								
* Significant at the 0.05 level								

Table 5. Correlation Table between Independent Variables

	Schedule	Cost	Performance	Work Quality	Services Provided	Productivity	Providing Innovation	Responding to Problems	Job Satisfaction	
Autonomy & Empowerment	0.365 0.000*	0.328 0.000*	0.523 0.000*	0.468 0.000*	0.452 0.000*	0.389 0.000*	0.473 0.000*	0.397 0.000*	0.608 0.000*	
Customizable Team	0.307 0.000*	0.334 0.000*	0.484 0.000*	0.474 0.000*	0.391 0.000*	0.408 0.000*	0.445 0.000*	0.372 0.000*	0.543 0.000*	
SME in Acq Process	0.339 0.000*	0.353 0.000*	0.439 0.000*	0.456 0.000*	0.346 0.000*	0.357 0.000*	0.368 0.000*	0.337 0.000*	0.412 0.000*	
Retention of Good Talent	0.372 0.000*	0.382 0.000*	0.509 0.000*	0.447 0.000*	0.392 0.000*	0.418 0.000*	0.420 0.000*	0.416 0.000*	0.476 0.000*	
Customer Involvement	0.370 0.000*	0.316 0.000*	0.414 0.000*	0.310 0.000*	0.439 0.000*	0.279 0.000*	0.300 0.000*	0.275 0.000*	0.408 0.000*	
Tangible Connection	0.366 0.000*	0.341 0.000*	0.428 0.000*	0.355 0.000*	0.499 0.000*	0.334 0.000*	0.326 0.000*	0.340 0.000*	0.394 0.000*	
Motivated Culture	0.333 0.000*	0.344 0.000*	0.376 0.000*	0.344 0.000*	0.342 0.000*	0.423 0.000*	0.416 0.000*	0.327 0.000*	0.349 0.000*	
Debrief Culture	0.389 0.000*	0.373 0.000*	0.523 0.000*	0.469 0.000*	0.393 0.000*	0.389 0.000*	0.425 0.000*	0.417 0.000*	0.518 0.000*	
Govt Tech Competence	0.276 0.000*	0.304 0.000*	0.435 0.000	0.421 0.000*	0.378 0.000*	0.388 0.000*	0.349 0.000*	0.347 0.000*	0.501 0.000*	
Legend										
Pearson <i>r</i>		Weak Correlation			Moderate Correlation			Strong Correlation		
* Significant at the 0.05 level										

Table 6. Correlation Table between Dependent and Independent Variables

	Schedule	Cost	Performance	Work Quality	Services Provided	Productivity	Providing Innovation	Responding to Problems
Schedule								
Cost	0.685 0.000*							
Performance	0.761 0.000*	0.632 0.000*						
Work Quality	0.639 0.000*	0.517 0.000*	0.793 0.000*					
Services Provided	0.481 0.000*	0.413 0.000*	0.635 0.000*	0.627 0.000*				
Productivity	0.666 0.000*	0.522 0.000*	0.754 0.000*	0.697 0.000*	0.580 0.000*			
Providing Innovation	0.474 0.000*	0.436 0.000*	0.633 0.000*	0.595 0.000*	0.538 0.000*	0.623 0.000*		
Responding to Problems	0.567 0.000*	0.371 0.000*	0.720 0.000*	0.658 0.000*	0.589 0.000*	0.638 0.000*	0.642 0.000*	
Job Satisfaction	0.604 0.000*	0.496 0.000*	0.783 0.000*	0.627 0.000*	0.535 0.000*	0.581 0.000*	0.539 0.000*	0.653 0.000*
Pearson <i>r</i>								
* Significant at the 0.05 level								

Table 7. Correlation Table between Dependent Variables

Forward and Backward Regression

Because all the independent variables were significant at the 0.05 level, forward and backward regression tests were performed. Doing so refined the results and determined the best subset of independent variables to predict a particular dependent variable. The forward selection method adds an independent variable to the model one at a time until addition of another independent variable does not improve the model (Milton & Arnold, 2003). Tables 8 through 17 display the detailed forward regression results for each dependent variable using IBM SPSS Statistics software. The backward selection method initially includes all the independent variables in the model, removes an independent variable one at a time, and stops until removal of another independent variable does not improve the model (Milton & Arnold, 2003). Both regression tests were performed to check for consistency. Table 18 provides the list of independent variables for each regression method. The backward regression method generated more independent variables than its counterpart, but both methods have at least one independent variable in common for each dependent variable.

This paragraph provides more details on cost, schedule, performance, and job satisfaction. They were specifically selected because cost, schedule, and performance are widely used metrics in DoD acquisition while job satisfaction is strongly correlated with four independent variables as Table 6 shows. Retention, debrief culture, and autonomy and empowerment (in no particular order) are the best collective subset of independent variables for cost, schedule, performance, and job satisfaction. Note that retention,

debrief culture, and autonomy and empowerment are variables that possess the strongest correlation with cost, schedule, performance, and job satisfaction.

Model	Unstandardized Coefficients		Std Coefficients	t	Sig.
	B	Std Error	Beta		
Dependent Variable: Average of Cost, Schedule, and Performance					
1. (Constant)	2.932	0.283		10.361	0.000
Debrief Culture	0.427	0.061	0.477	7.041	0.000
2. (Constant)	2.211	0.325		6.806	0.000
Debrief Culture	0.287	0.068	0.322	4.253	0.000
Retention	0.309	0.077	0.304	4.021	0.000

Table 8. Forward Regression Result – Average of Cost, Schedule, and Performance

Model	Unstandardized Coefficients		Std Coefficients	t	Sig.
	B	Std Error	Beta		
Dependent Variable: Cost					
1. (Constant)	2.867	0.366		7.829	0.000
Retention	0.434	0.081	0.382	5.356	0.000
2. (Constant)	2.405	0.391		6.155	0.000
Retention	0.295	0.092	0.259	3.190	0.002
Debrief Culture	0.240	0.081	0.240	2.955	0.004

Table 9. Forward Regression Result – Cost

Model	Unstandardized Coefficients		Std Coefficients	t	Sig.
	B	Std Error	Beta		
Dependent Variable: Schedule					
1. (Constant)	2.852	0.352		8.107	0.000
Debrief Culture	0.412	0.075	0.389	5.477	0.000
2. (Constant)	2.195	0.413		5.318	0.000
Debrief Culture	0.286	0.086	0.270	3.327	0.001
Retention	0.281	0.098	0.233	2.882	0.004

Table 10. Forward Regression Result – Schedule

Model	Unstandardized Coefficients		Std Coefficients	t	Sig.
	B	Std Error	Beta		
Dependent Variable: Performance					
1. (Constant)	2.852	0.290		9.837	0.000
Debrief Culture	0.494	0.062	0.523	7.963	0.000
2. (Constant)	2.034	0.329		6.178	0.000
Debrief Culture	0.336	0.068	0.356	4.911	0.000
Retention	0.350	0.078	0.327	4.505	0.000
3. (Constant)	1.829	0.341		5.365	0.000
Debrief Culture	0.222	0.088	0.235	2.523	0.013
Retention	0.303	0.081	0.282	3.759	0.000
Autonomy and Emp	0.196	0.096	0.196	2.054	0.041

Table 11. Forward Regression Result – Performance

Model	Unstandardized Coefficients		Std Coefficients	t	Sig.
	B	Std Error	Beta		
Dependent Variable: Quality of Work					
1. (Constant)	2.774	0.363		7.647	0.000
Customizable Team	0.519	0.074	0.474	6.986	0.000
2. (Constant)	2.688	0.356		7.561	0.000
Customizable Team	0.316	0.099	0.289	3.182	0.002
Debrief Culture	0.236	0.079	0.273	3.008	0.003
3. (Constant)	2.480	0.360		6.896	0.000
Customizable Team	0.196	0.109	0.179	1.799	0.074
Debrief Culture	0.206	0.078	0.238	2.637	0.009
Retention	0.210	0.083	0.214	2.526	0.012

Table 12. Forward Regression Result – Quality of Work

Model	Unstandardized Coefficients		Std Coefficients	T	Sig.
	B	Std Error	Beta		
Dependent Variable: Services Provided to Stakeholders					
1. (Constant)	2.732	0.330		8.278	0.000
Tangible Connection	0.511	0.069	0.499	7.438	0.000
2. (Constant)	2.301	0.362		6.355	0.000
Tangible Connection	0.363	0.087	0.355	4.172	0.000
Autonomy and Emp	0.237	0.088	0.228	2.677	0.008

Table 13. Forward Regression Result – Services Provided to Stakeholders

Model	Unstandardized Coefficients		Std Coefficients	t	Sig.
	B	Std Error	Beta		
Dependent Variable: Productivity					
1. (Constant)	2.486	0.447		5.568	0.000
Motivated Culture	0.557	0.092	0.423	6.039	0.000
2. (Constant)	1.790	0.478		3.744	0.000
Motivated Culture	0.388	0.102	0.295	3.803	0.000
Customizable Team	0.314	0.092	0.266	3.424	0.001

Table 14. Forward Regression Result – Productivity

Model	Unstandardized Coefficients		Std Coefficients	t	Sig.
	B	Std Error	Beta		
Dependent Variable: Providing Innovative Products					
1. (Constant)	2.379	0.360		6.604	0.000
Autonomy and Emp	0.514	0.074	0.473	6.966	0.000
2. (Constant)	1.211	0.483		2.508	0.013
Autonomy and Emp	0.390	0.080	0.360	4.898	0.000
Motivated Culture	0.369	0.105	0.257	3.498	0.001

Table 15. Forward Regression Result – Providing Innovative Products

Model	Unstandardized Coefficients		Std Coefficients	t	Sig.
	B	Std Error	Beta		
Dependent Variable: Responding Quickly to Problems					
1. (Constant)	3.213	0.341		9.425	0.000
Debrief Culture	0.434	0.073	0.417	5.948	0.000
2. (Constant)	2.456	0.396		6.203	0.000
Debrief Culture	0.288	0.082	0.277	3.496	0.001
Retention	0.324	0.094	0.274	3.467	0.001

Table 16. Forward Regression Result – Responding Quickly to Problems

Model	Unstandardized Coefficients		Std Coefficients	t	Sig.
	B	Std Error	Beta		
Dependent Variable: Job Satisfaction					
1. (Constant)	1.445	0.334		4.322	0.000
Autonomy and Emp	0.680	0.068	0.608	9.936	0.000
2. (Constant)	0.968	0.367		2.637	0.009
Autonomy and Emp	0.555	0.080	0.496	6.939	0.000
Retention	0.245	0.086	0.205	2.865	0.005

Table 17. Forward Regression Result – Job Satisfaction

Dependent Variables	Forward Regression Independent Variables	Backward Regression Independent Variables
Cost	Retention Debrief Culture	Motivated Culture Retention Debrief Culture
Schedule	Debrief Culture Retention	Retention Debrief Culture Customer Involvement
Performance	Debrief Culture Retention Autonomy & Empowerment	Retention Debrief Culture Autonomy & Empowerment
Quality of Work	Customizable Team Debrief Culture Retention	Retention Debrief Culture SME in Acquisition
Services Provided to Stakeholders	Tangible Connection Autonomy & Empowerment	Tangible Connection Autonomy & Empowerment
Productivity	Motivated Culture Customizable Team	Motivated Culture Retention Customer Involvement Autonomy & Empowerment
Providing Innovative Products	Autonomy & Empowerment Motivated Culture	Motivated Culture Retention Customer Involvement Autonomy & Empowerment
Responding Quickly to Problems	Debrief Culture Retention	Retention Debrief Culture
Job Satisfaction	Autonomy & Empowerment Retention	Retention Autonomy & Empowerment Customizable Team

Table 18. Forward and Backward Regression Comparison

Statistical Analysis for Research Question #2

One-Way Analysis of Variance

Table 19 contains the test statistic and significance value for each variable.

Independent Variables	Mean Square MST MSE	Test Statistic: F	Significance
Autonomy and empowerment	6.089 1.576	3.863	0.051*
Customizable team	2.534 1.217	2.082	0.151
SME in traditional acquisition process	2.887 1.637	1.763	0.186
Retention of good talent	7.463 1.454	5.133	0.025*
Customer involvement	0.286 1.506	0.190	0.664
Tangible connection	4.565 1.789	2.551	0.113
Motivated culture	4.013 1.008	3.980	0.048*
Debrief culture	4.878 1.770	2.756	0.099
Government technical competence	1.464 1.298	1.128	0.290

* Significant at the 0.05 level

Table 19. One-Way ANOVA Result

To establish whether rapid and non-rapid programs do not share a common critical success factor(s), a one-way ANOVA was performed through IBM SPSS Statistics software. The hypothesis test used the following *F*-ratio test statistic.

$$F = \frac{\text{Mean Square for Treatments (MST)}}{\text{Mean Square for Error (MSE)}}$$

MST measures the variability *among* the means of rapid and non-rapid programs, while MSE measures the sampling variability *within* rapid and non-rapid programs (McClave, Benson, & Sincich, 2014). The rejection region is $F \geq F_{\alpha}$ where $\alpha = 0.05$.

This research used the question that directly asked respondents whether they operate in a rapid or non-rapid program as the grouping variable or factor in SPSS. The options for the question comprised *Yes*, *No*, or *Uncertain*. The results in Table 19 did not include the *Uncertain* responses because those who chose this option were either new to the program, new to the acquisition career field, or simply unsure.

Research Questions Answered

Research Question #1: Which attributes of the RT-34 Expedited SE framework are contributing factors to the success of a rapid acquisition program?

As Table 6 illustrates, the relationship between the *i*th independent variable and *j*th dependent variable are primarily moderately correlated while the remainder have either a weak or strong correlation. Notwithstanding, the hypothesis tests for all 81 hypotheses showed significance at the 0.05 level, signifying there is a relationship between the *i*th independent variable and *j*th dependent variable.

Based on the aforementioned results, autonomy and empowerment, customizable team, SME in traditional acquisition process, retention of good talent, customer involvement, tangible connection, motivated culture, debrief culture, and government technical competence are contributing elements to success of rapid acquisition programs. Furthermore, success of rapid acquisition programs is measured in terms of nine dimensions: a) completing work on time; b) completing work within budget; c) overall

performance; d) quality of work; e) services provided to stakeholders; f) productivity (quantity of work); g) providing innovative services or products; h) responding quickly to problems or opportunities; i) job satisfaction. In other words, each critical success factor positively contributes to each success criterion.

The forward and backward regression tests fine-tuned and converged the model down to three critical success factors in terms of cost, schedule, performance, and job satisfaction. DoD acquisition should place priority, in no particular order, on retention of good talent, debrief culture, and autonomy and empowerment.

According to Lepore et al. (2012), retention of good talent is associated with (1) programs that require a long-term commitment (around 3-4 years), (2) keeping good talent for as long as possible, and (3) cultivating individuals in executing organizational processes through on-the-job experience. Debrief culture pertains to (1) emphasis on learning from mistakes and finding the root cause of these mistakes, (2) having a “mistakes are okay but are not okay to be repeated” mindset, and (3) a culture where the practice of “lessons learned” is ingrained to prevent making the same errors in the future (Lepore et al., 2012). Autonomy and empowerment refers to (1) the ability to make decisions with full support of leaders, (2) being empowered to make decisions by having many degrees of freedom, and (3) leadership is observed and executed from the lower to higher tier (Lepore et al., 2012).

Research Question #2: Which critical success factors are not common to rapid and non-rapid (traditional) programs?

Based on the results in Table 19, hypotheses 8a, 8d, and 8g were rejected because their respective p-value was less than $\alpha = 0.05$. This is an indication that non-rapid

(traditional) programs do not embody the following three critical success factors: autonomy and empowerment, retention of good talent, and motivated culture.

Summary

This research utilized the correlation coefficient, significance testing of the correlation coefficient, forward and backward regression test, and one-way ANOVA test through IBM SPSS Statistics. The first three statistical techniques analyzed the first research question while the one-way ANOVA tested the second research question.

Most of the relationships between a critical success factor and a success criterion are moderately correlated, but all relationships were found significant. These analyses revealed all nine critical success factors are indeed contributing factors to nine dimensions of success of rapid acquisition programs. Further, retention of good talent, debrief culture, and autonomy and empowerment emerged as the best predictor variables out of nine critical success factors for *rapid* acquisition programs. It was also found that autonomy and empowerment, retention of good talent, and motivated culture are critical success factors that are embodied by *rapid* programs but not embodied by *non-rapid* (*traditional*) programs.

V. Conclusions and Recommendations

Introduction of Research

As a step toward improving the defense acquisition process to keep pace with the high-velocity technological advancements, Lepore et al. (2012) sought to identify attributes which characterize rapid acquisition programs from a systems engineering perspective, although the result was interesting as most responses trace to the dimension of *people*. Further, their observations and interviews assumed the resultant attributes were indeed critical success factors.

Lepore et al. (2012) developed a framework, RT-34 SE Expedited Framework, that characterizes rapid acquisition programs' attributes. The framework is divided into cultural, rapid, and organizational practices. Sub-sections of the organizational practices integrate *people*, *processes*, and *products*. Due to the framework's vast scope, this research concentrated on the dimension of *people* as extant literature primarily examined the procedural and product factors.

Thus, this research extends Lepore et al.'s study by asking two questions:

1. Which factors from the *people* dimension contribute to success of rapid acquisition programs?
2. Which critical success factors do rapid and non-rapid (traditional) acquisition programs practice not have in common?

Limitations of Research

This research has its share of limitations. It is important that the readers consider these factors when viewing the results.

1. This survey was not pre-tested for usefulness and readability. Respondents provided several recommendations post-survey completion. Examples of feedback are indicated below.
 - a. The questions should have explicitly stated that the program in question strictly refers to the respondent's current program at the time of data collection.
 - b. The questions should have explicitly stated the survey is concerned with actual in lieu of ideal occurrences.
 - c. Use of terms with a strong connotation as "competitive" may affect responses due to its varying interpretation.
2. The survey application, milSurvey, generated a few setbacks.
 - a. Respondents have complained about submitting the survey sans any acknowledgement. Some returned to the site to complete the survey, possibly for the second time. If that is the case, that could have affected the number of data and ultimately the results. milSurvey, to the best of the researcher's knowledge, provides no method to detect duplicate responses.
 - b. The survey would have obtained over 600 responses if frequent errors such as inactivity and the aforementioned did not occur.

3. As previously mentioned in Chapter IV, two directorates with a substantial percentage of rapid acquisition program office were unable to participate. It is interesting to consider whether their participation may have altered the result.
4. Retention of good talent was shown as not only a critical success factor that takes priority in rapid acquisition programs but also a factor that is not embodied by non-rapid acquisition programs. However, its question had a low Cronbach alpha at 0.512. It may have been beneficial to utilize an existing questionnaire with proven measure on this factor, provided it exists.
5. This research is subject to self-selection bias since the qualification criteria to complete the survey had little restriction. It is possible the responses were primarily negative toward the DoD acquisition process.
6. The human factor adds subjectivity and error to the process. Answers could have possibly been reported by accident (e.g., respondent intended to select “Agree” but mistakenly chose “Slightly agree”). The subjectivity piece was evident with the receipt of thoughtful and valuable comments from respondents. These could have enhanced the questionnaire.

Interpretations of Research

According to the results and analysis section, the nine critical success factors observed by Lepore et al. (2012) do de facto contribute to each of the nine dimensions of success of rapid organization programs. Given the comprehensive assessment and narrative of Lepore et al. (2012), the results are not at all surprising.

Rapid organizations are widely known for having less oversight in contrast with traditional organizations with several layers of approving officials. The former allows program managers and individuals from other acquisition disciplines to make decisions sans prior approval from higher authorities. It is interesting to see only a moderate correlation between autonomy and empowerment and completing work on time. One could claim the ability to make decisions immediately would hasten the rate of job completion. On another note, autonomy and empowerment are strongly correlated to performance and job satisfaction. This makes sense because autonomy and empowerment enable one to simply do her job.

A customizable team is defined as follows: (1) the freedom to recruit members of one's team with the right education, skill, and experience; (2) a skilled team member with a vast experience in other areas is a part of the team; (3) skills and knowledge related to a particular program or technology or weapon system are developed; (4) team members leverage the strengths of one another (Lepore et al., 2012). The description was worth addressing because these activities, especially the first two, are difficult to attain. With all the variables involved—size of workforce, different education, rank, years of experience, preference, Air Force needs, and more—it is an arduous task for the acquisition career field managers to optimally place the right person in the right spot. Since traditional acquisition is presently the norm, it would be difficult for many traditional program offices to be able to customize its team. Table 6 also displays a strong correlation between this attribute and job satisfaction. This can be supported with the notion that, rather than being directed to move to another assignment, members

voluntarily accept the job for which they are being recruited. In essence, these members have more control in their professional life, making work more satisfying.

The traditional acquisition process is such an intricate object with numerous gray areas. The fact that it is tailorable makes it even more complex. One is likely always thinking of ways to quickly obtain an approval without undergoing the unabridged process, and this is where traditional acquisition SMEs become the most valued person. What separates someone who is a part of a rapid program from a traditional program is the culture in which she is trained in, although there are certainly traditional acquisition process SMEs in traditional programs. Rapid organization personnel are consistently looking for ways to meet the needs of their program by tailoring the process whereas traditional acquisition staff typically do not deviate from regular routine. In fact, a respondent censured some of his colleagues for operating under the assumption that there is only one way of doing things.

It is difficult to retain good talent because the AF grooms leaders to have breadth of knowledge and experience (U.S. Air Force, 2015). Once again, because rapid acquisition is not the norm, there typically is an exception made to keep a talented person on the job. Conversely, this will be troublesome to execute for traditional organizations as there is an abundance of them in AF acquisition. It is not astonishing to find a strong relationship between retention of good talent and performance.

Customer involvement tops the attribute with the highest amount of extant literature. Rightfully so as consistent and frequent engagement of and with customers keeps all concerned parties informed of a program's progress. Any required changes or setbacks can be rapidly resolved, increasing the likelihood of program success. By the

same token, the acquisition community needs to be continuously operationally-focused, rather than being absorbed in the “business” side of the job.

Colquitt et al. (2011) defined task identity as the extent to which a job requires completion of a concrete product from inception. This is one factor that creates value in one’s career, and this is the same factor that has been observed in rapid organizations. As the name implies, rapid organizations can deploy capabilities substantially faster than traditional programs. A physical or finished product, to some, is an affirmation of being a part of a larger scheme or purpose. Unfortunately for traditional programs, it takes a long time to field a finished product. Even moving from one milestone to another takes longer than a PCS rotation schedule. To some, it becomes a challenge to find meaning in a career that does not produce tangible items.

Motivated culture, debrief culture, and government technical competence are three attributes with little to no extant literature. Lepore et al. (2012) explained rapid organization personnel’s mindset as one who is not only motivated but also collaborative, impatient, creative, technical, and independent. “Mistakes are [okay], but it is not [okay] to repeat them” (Lepore et al., 2012) is also ingrained in their culture. While one could argue that traditional acquisition programs embody some of these features, rapid acquisition programs simply have the freedom to deviate from normal acquisition operation. For example, creativity is ordinarily undetected in traditional programs because of the “this is the way we’ve done it” mentality. Further, military in general has an aversion to risk (Grudo, 2018; Lopez, 2017) so traditional acquisition practitioners would likely be hesitant in taking the leap and being revolutionary lest they make errors. Lastly, technical competence needs a revival in AF acquisition. This is supported by one

respondent's assertion that engineers require more training on technical evaluations, for example, as they simply do not know how to correctly complete one.

Recommendations for Action/Future Research

Now that it has been determined that nine *people* attributes from RT-34 SE Expedited Framework are conducive to rapid acquisition programs' success, this research recommends implementing the *people* dimension of this framework to a small traditional acquisition program as a pilot study. If proven to be successful, this may serve as the benchmark for other traditional programs and the foundation to slowly wean DoD acquisition of traditional practices by making *rapid* the new standard. However, some argue against this idea. Rather than normalizing rapid acquisition, future research can assess whether the critical success factors within the *people* dimension is modifiable depending on various factors. This can be a similar technique as the forward and backward regression method. For example, a different grouping variable or factor (e.g., domain, type of weapon system) will determine which of the critical success factors are conducive to a particular group of program.

An area for further research is to conduct the same research in a different domain such as space. Since space and missile systems are not in AFLCMC's purview, it is worth investigating whether these attributes are critical success factors to a space program.

Another area for future research is to determine whether the benefits of implementing the critical success factors far outweigh the costs associated with doing so.

Since it is not known whether the effect of ISR/SOF and Armament directorates' lack of input is significant, future research should be conducted by mirroring this research but ensuring attendance of personnel from both directorates.

This research utilized the participants' perspective to measure success. Another area for research is to mirror this research with the exception of employing formal metrics such as EVMS as a form of success measurement.

Research Contribution/Summary

This research is only at the rudimentary phase with respect to the NDS' goal of delivering superior warfighting capabilities on time and within budget but is a step toward enhancement of AF acquisition. In keeping with the Air Superiority 2030 Flight Plan, this research hopes to contribute to AFLCMC's plan to develop a utopian SPO by 2030 (SPO 2030) – a SPO that can rapidly respond to threats in today's changing environment.

Appendix A: Online Survey

Introduction

The purpose of this research is to examine whether distinct attributes of a program are conducive to its success or lack thereof. Taking part in this research activity is completely voluntary. Your participation indicates:

- You agree to be in this activity.
- You have read and understand the general description of the research above.
- You understand that participating in this research does not take away any of your legal rights.

Be sure to answer each question with certainty before you proceed to the next question as you will not be able to return to the previous question once you click "Next."

If you agree with this informed consent, please select "Next" to continue at the bottom of this page.

Privacy Act Statement

Authority: We are requesting disclosure of personal information. Researchers are authorized to collect personal information on research subjects under The Privacy Act-5 USC 552a, 10 USC 55, 10 USC 8013, 32 CFR 219, 45 CFR Part 46, and EO 9397, November 1943.

Purposes: It is possible that latent risks or injuries inherent in this experiment will not be discovered until sometime in the future. One purpose of collecting this information is to aid researchers in locating you at a future date if further disclosures are appropriate. A second purpose for collecting this information is to ensure your identity in requesting laboratory tests and the like, recording the results in your health record, as appropriate, and paying you.

Routine Uses: Information may be furnished to Federal, State and local agencies for any uses published by the Air Force in the Federal Register, 52 FR 16431, to include, furtherance of the research involved with this study and to provide medical care and compensation.

Disclosure: Disclosure of the requested information is voluntary. No adverse action whatsoever will be taken against you, and no privilege will be denied you based on the fact you do not disclose this information. However, your participation in this training, compensation thereof, and management of medical information pertaining to you may be impacted by a refusal to provide this information.

Section A: Questionnaire

1. To what extent do you agree with the following statements:

	Strongly Disagree	Agree	Slightly Disagree	Neither Agree Nor Disagree	Slightly Agree	Agree	Strongly Agree
Customers/users are consistently involved in the decision-making process through short- and/or long-term on-site representatives.							
Individuals are allowed to make decisions where leaders stand behind these decisions.							
Expert individuals who possess specific skill set and a broad set of experiences are a part of the team.							
Regular customer/user input and conversations through reviews as well as close relationship and coordination process with customers/users are the norm.							
Keeping in mind that providing capability may very well be a matter of survival and mission success for military members.							
There is a high level of expectations for government personnel to run a program as contrasted with increased or over-reliance on contractors.							
Learning from mistakes and processes to identify individual or organizational root causes to improve future endeavors are emphasized.							
There is an opportunity to see the full project from concept definition through development and launch into operational use.							
The choice to acquire members of the Integrated Product Team with the right education, experience, and personality is available and executable.							
Individuals possess deep roots and experience in acquisition, contracting, finance, and engineering standard processes.							
There is a capacity to influence on-the-job experience as individuals grow in their ability to execute organizational processes.							

2. To what extent do you agree with the following statements:

	Strongly Disagree	Agree	Slightly Disagree	Neither Agree Nor Disagree	Slightly Agree	Agree	Strongly Agree
Technical competence is the standard (not the exception) for every member of the Integrated Product Team.							
Individuals are comfortable and empowered in decision-making by having many degrees of freedom.							
The concept of "lessons learned" is ingrained to prevent the same errors from reoccurring.							
The choice to handpick members of the Integrated Product Team (in lieu of dependence on AFPC selection) is available and executable.							
The "mistakes are okay, but it is not okay to repeat them" mindset is ingrained in and practiced by every member of the Integrated Product Team.							
A long-term commitment (around 3 to 4 years) to a specific program is a requirement.							
Individuals have keen awareness of the implications from omitting or tailoring a step in the acquisition process.							
Skills and knowledge that are specific to the program's customers/users, technologies, and operational context are cultivated.							
Autonomy or empowerment exists in the leader and is earned by those at the lower level.							
The effect of seeing the fruits of labor utilized by the intended customer/user is concrete.							
The government employee (e.g., engineer, program manager, etc.) is expected to be the resident expert on the program.							

3. To what extent to do you agree with the following statements:

	Strongly Disagree	Agree	Slightly Disagree	Neither Agree Nor Disagree	Slightly Agree	Agree	Strongly Agree
Individuals express a competitive nature born from a unique skill set.							
Individuals strategically leverage the strengths of each other to make up for a specific lack of knowledge and skill.							
Every member of the team is technically able to run his/her portion of the program regardless of government or contractor responsibility.							
End users are considered as people (ex: Capt John Smith) rather than a category (F-22 pilot).							
Individuals have an acute proficiency and depth pertaining to the application of the traditional acquisition process.							
A long-term commitment (around 3 to 4 years) to a specific program is a requirement.							
There is a direct connection to an operational community.							
A tangible connection exists to helping accomplish an operational mission.							
There is a focus on full use of government personnel capabilities.							
Leadership is repeatedly embodied at all levels to allow teams to focus on executing the mission.							
Great talent is retained for as long as possible.							
The environment imbues an aggressive and competitive culture.							

4. On a scale of 1 to 9, rate the following attributes that aptly embody your program in the order of importance from most important (1) to least important (9).
- Empowered leadership and autonomy for team members
 - Team is populated with specific skills and experience
 - Deep knowledge and skills in traditional acquisition process
 - Retention of personnel with good talent
 - Consistent customer/user input and buy-in every step of the way
 - Every member is connected to the mission and vision (operation-focused)
 - Maintain high levels of motivation
 - Exhibits the “mistakes are okay” culture
 - The government team leads the way

5. Please rate the effectiveness of your Integrated Product Team on the following dimensions:

	Very Much Below Average	Below Average	Slightly Below Average	About Average	Slightly Above Average	Above Average	Very Much Above Average
Quality of work done							
Customer/user/stakeholder service provided							
Productivity (i.e., quantity of work completed)							
Completing work on time							
Completing work within budget							
Providing innovative products or services							
Responding quickly to problems or opportunities							
Job satisfaction of the members							
Overall performance							

6. Please rate the extent to which you believe each of the following statements applies to your Integrated Product Team:

	Strongly Disagree	Agree	Slightly Disagree	Neither Agree Nor Disagree	Slightly Agree	Agree	Strongly Agree
New ideas are constantly sought and tried in my Integrated Product Team.							
Most people here welcome change and view it as healthy and non-threatening.							
People who make innovations are frequently recognized for their efforts.							
There are many opportunities to learn new skills.							
People are encouraged to learn as much as they can about all aspects of the division.							
Learning is highly valued here.							
There is a high sense of accountability in my Integrated Product Team for the decisions we make.							
There is a high sense of accountability in my Integrated Product Team for the work we perform.							
People here feel personally responsible for the productivity and quality of work performed in their area.							
I frequently work with other people in the division besides the people on my Integrated Product Team.							
There is little conflict between my Integrated Product Team and other Integrated Product Teams in the division.							

7. Please rate the extent to which you believe each of the following statements applies to your Integrated Product Team:

	Strongly Disagree	Agree	Slightly Disagree	Neither Agree Nor Disagree	Slightly Agree	Agree	Strongly Agree
Integrated Product Teams in the division cooperate to get the work done.							
I like my work best when I do it all myself.							
I prefer tasks that allow me to work with others.							
I would rather work alone than with other people.							
The less I have to rely on others to work, the happier I am.							
I would rather work through a work problem myself than ask for advice.							
Working in small groups is better than working alone.							
Your Integrated Product Team plans together and coordinate efforts.							
Your Integrated Product Team makes good decisions and solve problems well.							
Persons in your Integrated Product Team know what their jobs are and know how to do them well.							

8. Please rate the extent to which you believe each of the following statements applies to your Integrated Product Team:

	Strongly Disagree	Agree	Slightly Disagree	Neither Agree Nor Disagree	Slightly Agree	Agree	Strongly Agree
Information about important events and situations are shared within your Integrated Product Team.							
Your Integrated Product Team wants to meet its objectives successfully.							
Your Integrated Product Team is able to respond to unusual work demands placed upon it.							
You have confidence and trust in the persons in your Integrated Product Team.							
I prefer certainty rather than taking risks at work.							
It is better to have job requirements and instructions spelled out in detail so that I know what I am expected to do.							
Rules and regulations are important because they tell me what the organization expects of me.							
I follow rules precisely in order to perform well.							
I prefer work to have detailed standard operating procedures spelled out to me.							
I prefer to have supervisors who expect me to follow instructions and procedures closely.							

Section B: Demographic

1. Years of acquisition experience: _____

2. Function

- Program Management
- Engineering
- Finance
- Contracting
- Logistics
- Test
- Other: _____

3. Rank

- General
- Lieutenant General
- Major General
- Brigadier General
- Colonel
- Lieutenant Colonel
- Major
- Captain
- First Lieutenant
- Second Lieutenant
- Chief Master Sergeant

- Senior Master Sergeant
- Master Sergeant
- Technical Sergeant
- Staff Sergeant
- Senior Airman
- Airman First Class
- Airman
- Contractor
- Civilian (please specify): _____

4. Directorate

- Agile Combat Support
- Armament
- Business and Enterprise Systems
- C3I and Networks
- Digital
- Fighters and Bombers
- ISR/SOF
- Mobility and Training Aircraft
- Presidential Aircraft Recapitalization
- Tanker
- Other: _____

5. Division: _____

6. Does any of the following description apply to your program?
- i. Program formally operates as a government rapid acquisition office.
 - ii. Program utilizes rapid acquisition authorities. A few examples are listed below.
 1. National Defense Authorization Act for FY 2016, Section 804 for Middle Tier Acquisition
 2. Other Transaction Authority
 3. Federal Acquisition Regulation, Part 16, Class Justification and Approval
 - iii. Program is designated as Joint Urgent Operational Need, Urgent Operational Need, Joint Emergent Operational Need, or Immediate Warfighter Need.
 - iv. Program does not entirely practice the traditional DoD 5000 acquisition cycle.
- Yes
- No
- Uncertain

7. Briefly specify what makes your program rapid or explain the details behind your uncertainty if you answered 'Yes' or 'Uncertain,' respectively, to the previous question. _____

8. Are you a supervisor?

- Yes
- No

9. If you chose yes, how many people do you supervise? If you answered no, please enter 0 and press next. _____

10. To what degree do you agree with the following statements:

	Strongly Disagree	Agree	Slightly Disagree	Neither Agree Nor Disagree	Slightly Agree	Agree	Strongly Agree
My Integrated Product Team operates in a rapid framework.							
My Integrated Product Team entirely employs traditional acquisition practices.							
My Integrated Product Team prepensely develops or fields systems in a shortened manner.							

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Air Force Institute of Technology, Wright-Patterson AFB, OH
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2015-2017 **Program Manager, B-2 Avionics and Armament Division**
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2002-2015 **US Air Force Enlisted Member**
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14. ABSTRACT Department of Defense (DoD) acquisition programs continue to encounter schedule delays and cost overruns despite past reforms. Global threat uncertainties and high-velocity technological advances are also prevailing. Given the current rate at which program offices are fielding weapon systems, the United States (US) may be fighting with obsolete weapons and technology. Gaining superiority demands a new approach – to expedite the rate of capability delivery through rapid acquisition programs who have demonstrated success in delivering capabilities with speed. This research examines whether the attributes in the <i>people</i> dimension of an expedited framework contribute to success of rapid defense acquisition programs. Through standard statistical techniques, this research finds the following nine attributes—autonomy and empowerment, customizable team, SME in traditional acquisition process, retention of good talent, customer involvement, tangible connection, motivated culture, debrief culture, and government technical competence—are critical to success of rapid programs. Out of those factors, retention of good talent, debrief culture, and autonomy and empowerment emerge as the best predictors for rapid programs. This research also finds that the attributes autonomy and empowerment, retention of good talent, and motivated culture are embodied by rapid programs but not by traditional (non-rapid) programs.					
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