Stakeholder Salience Influence on Bureaucratic Program Enterprise Value Creation

by

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B.S. Computer Engineering, United States Military Academy, 1990
M.S. Applied Mathematics, Naval Postgraduate School, 1999

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ABSTRACT

In 2009, the Government Accountability Office reported that two-thirds of major weapon systems acquisition programs were required to report budget overruns and were almost two years behind schedule for delivery of capability to the warfighters. The Secretary of Defense and the President of the United States asked the same question: "How do we fix DOD acquisition?"

The Acquisition system has been studied nearly continuously for more than forty years. Applying traditional system engineering methods have not improved performance, but developed a highly-complex bureaucracy that is viewed as inflexible, unscalable, unreliable, and (recently) unsustainable. With this seemingly intractable challenge, this work uses the synergy of integrating approaches based on engineering, management, and social sciences to develop a new framework to help understand the policy resistance of many previous unsuccessful initiatives.

This research seeks to develop a dynamic enterprise engineering system framework using case study methodology to integrate three widely adopted but disparate frameworks by evaluating the influence relationships. Informed by the enterprise architecture, this new framework seeks to incorporate stakeholder salience and its dynamic influence on value creation as an endogenous factor in the context of the bureaucratic program enterprise of DOD acquisition. This work not only proposes an intermediate level theory but also provides insights for policy implications.

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Biographical Summary of Author

Douglas Matthew Matty is a Lieutenant Colonel in the United States Army. He was born in Pittsburgh, Pennsylvania and graduated from Norwin High School, North Huntingdon, Pennsylvania. He graduated from the United States Military Academy in 1990 with a B.S. in Computer Engineering, and was commissioned as an officer in the Air Defense Artillery. After serving in numerous operational assignments in the United States and Europe, He was selected for two consecutive battery commands and served as Brigade Adjutant and Personnel Officer. In 1999, he was awarded a M.S. in Applied Mathematics the Naval Postgraduate School, Monterey, California. He was selected to join the research staff in the U.S. Army's Operations Research Center of Excellence, West Point, New York from 1999 to 2000. He was then selected as Assistant Professor of Mathematical Sciences at the U.S. Military Academy serving as Assistance and Principle Course Director for the Core Course, Probability and Statistics with an enrollment of 1300 students. From 2002 to 2004, He served as Division Chief and Senior Operations Analyst for the U.S. Army Operational Test Command overseeing operational analysis for the Army's two largest operational tests, the Stryker and PATRIOT PAC-III. He was then re-assigned as a program readiness analyst in the Department of the Army staff from 2004 to 2005. At this time, he was selected to serve as the senior analyst for the Secretary of the Army's Business Transformation initiative from 2005 until 2007 and earned his Lean Six Sigma Master Black Belt. In 2007, He enrolled as a Ph.D. student in Engineering Systems program at the Massachusetts Institute of Technology. In July 2010, he was selected and assigned as a student to the U.S. Army War College.

He is married to the former Deanna Johnson Matty, and they have two sons, Thomas and Johnathan. Douglas also serves on the board of trustees for the LT Michael Adams Memorial Foundation and is an officer of the board of trustees for Project Healing Waters Fly Fishing.

Acknowledgements

In the words of my great-grandmother, I have been blessed. Coming from the blue-collar and proud region of the three rivers, I grew up in a world of coal mines, steel mills, farms and hard work. My family that emphasized that it is our purpose to use our God-given talents to contribute and help our neighbors. The women in my life have been particularly influential: my two grandmothers with their fortitude and determination; my mother's insistence that success only comes through education; and my wife who provides balance, support, and an optimism that amazing things can happen even to those who don't deserve it. My Father has been the principle inspiration for this effort. His never-ceasing love of solving problems set him apart as the epitome of a great engineer. Just weeks before his untimely passing, he completed his last project; with his own time and resources on the dining room table, developing a control system to prevent workers in his laboratory from being accidentally injured or killed from high-power testing equipment. His purpose was to do God's work for people through engineering, and he was an archangel.

There are several individuals that I wish to thank for their support and intervention that resulted in my admission and success in this program. The Honorable John Murtha believed in my potential, nominating me as his cadet to the United States Military Academy and participated in my promotion ceremony to my current rank before his recent passing. The Honorable Thomas Kelly, III, and Honorable Michael Kirby allowed me the opportunity to pursue this degree with their successful "homework project." LTG(R) N. Ross Thompson, III, whose leadership, mentorship and support enabled this research to be possible. MG(R) James Myles provided infinite support and mentorship for nearly seven years to get me into and through this doctoral odyssey and helped "ground-guide" me into the aviation community. There have been three significant guides that have helped provided the mentorship that shaped my career that allowed me to complete the work. LTG Bob Lennox, who I met as young cadet, taught me that math was not black and white, but a way to see the world and the relationships that make it dynamic. COL(R) Greg Parlier, who has been my ORSA mentor since I first read his Command Philosophy as my Battalion Commander, provided insight after insight in teaching me to see the world through a systems view. COL(R) Ronald Rezek adopted me as a Major and showed me a whole new side of the world "in the building" and how to have fun while crusading for the Army.

I do not deserve the wonderful committee that has helped me, but again, I was gifted by their support. My Chair, Professor Nightingale never wavered in her belief of my work. She is professionally and personally a gift from above. Professor Madnick took the risk to allow an Army Officer with 36 months allowed to pursue a degree at the greatest engineering school in the world and pragmatically and wisely helped push me forward. Dean Hastings provided invaluable insights to vector the effort in both magnitude and direction. Professor Agle answered the "call to duty" and supported my work based on his own sense of Patriotism for the nation and the Army. His willingness to roll up his sleeves and teach, educate and train were invaluable.

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1 Introduction

1.1 Current Challenges of Defense Acquisition

1.1.1 Fiscal Realities

During the final stages of the submission of the 2009 Federal Budget by the Executive Branch to Congress, Department of Defense (DOD) Major Acquisition Programs came under scrutiny as, subsequently, several DOD programs were reduced or cancelled. The U.S. Army's Future Combat System was cancelled – its largest and most complex acquisition effort since the simultaneous acquisition of the "Big Five": the Abrams Tank, the Bradley Fighting Vehicle, the Apache Helicopter, the Blackhawk Helicopter, and the PATRIOT air defense artillery system.

This 2009 budget decision followed a decade of well-publicized technical and political challenges to the defense acquisition program. At its inception, the Future Combat System (FCS) was bestowed with the Army leadership's wholehearted support. In 1999, then Army Chief of Staff, General Eric Ken Shinseki sought sufficient funding to create "irreversible momentum" for the program (Shinseki 1999). The program incorporated the most advanced technical methodologies to support program management and engineering efforts. However, this combination of institutional and technical momentum still proved to be insufficient to withstand the dynamics that have inhibited DOD acquisition. The Government Accountability Office has persistently cited systemic DOD acquisition issues (GAO 2001; GAO 2004; GAO 2006; GAO 2008; GAO 2009).

The Army and the other defense services have been aware of these perceived shortcomings in program management. The Assistant Secretary of the Army - Acquisition, Logistics and Technology commissioned a study to improve the management systems to inform key decisions and oversight of acquisition programs (Higbee and Ordonio 2005). This study merged two different approaches, a purely technical program management perspective and a holistic "program health" overview. The resulting Army Probability of Success management system has been adapted in other services.

1.2 Probability of Success Management System

1.2.1 Internal

The technical approach to program management identified factors related to the research, design, engineering and production of a program: program requirements, program resources and program execution (Higbee 2006).

These factors were then represented in qualitative assessments arrayed into subcategory metrics. Examples of these metrics would include number of requirement changes, current and planned financial resources, Earned Value Management scores for developers, and other quantitative measurements. These metrics then supported assessments of the program's probability for success, reflecting issues of cost, schedule, and performance. However, the Probability of Success system considers more than just these technical issues.

1.2.2 External

Unlike traditional program assessment, the Probability of Success System assesses a program's Fit into Capability/Vision and the Program Advocacy. Program Fit into Capability Vision indicates how well a program integrates into and contributes to the synergy for major DOD initiatives such as Transformation, Interoperability, Jointness/Other, and Army plans for current and future force designs. On the other hand, Program Advocacy accounts for the influence of parties outside the Army on the program's success.

1.2.3 Program Advocacy

This final consideration captures the perceptions about the program by organizations outside the program office or its support contractors. Interestingly, while the resolution of the two approaches resulted in the inclusion of this last factor, the significance of this non-traditional factor intensified. As all the factors were weighted, Program Advocacy received the highest weighting value with a quarter of the total possible points. This may seem an intuitive allocation in hindsight; it was indeed a significant departure from the leadership's traditional evaluations of programs. This departure represents a dramatic shift from managing tasks to managing program enterprises. Leaders are now accounting for the influences of the following organizations: Office of the Secretary of Defense, the Joint Staff, War Fighters (Combatant Commanders), Army Leadership, Congress (and

staffers), Industry, International parties (for allies or potential Foreign Military Sales).
These influences are assessed through the established management archetype of the U.S.
government - bureaucracy.

1.3 Two Perspectives Identify Issues

Since the establishment of the DOD in 1947, DOD acquisition leaders have faced
their challenges primarily by attempting to improve the acquisition process or to manage
the institutional influence (loosely referred to as politics) on defense acquisitions. As the
following discussion indicates, recent senior leaders have concentrated primarily on
improving the process, then as conditions required, they attempting to manage
institutional influences as conditions required

1.3.1 Senior Leadership Perspective

An unprecedented event occurred in 2009: Secretary of Defense Gates preempted
the President's budget submission to Congress by conducting a press conference to
present the DOD's Budget. The Secretary specifically targeted several large weapon
system programs. Not only did Secretary Gates cite specific justifications for halting the
programs, but he also chastised the Defense Acquisition efforts in general:

> Entrenched attitudes throughout the government are particularly pronounced in
> the area of acquisition: a risk-averse culture, a litigious process, parochial
> interests, excessive and changing requirements, budget churn and instability,
> and sometimes adversarial relationships within the Department of Defense and
> between DOD and other parts of the government. (Gates 2009)

These comments dramatize the challenges of balancing the technical process of
acquisition and the institutional influence of the various organizations that participate
directly and indirectly in the acquisition effort. The Secretary cited these specific
technical issues: a litigious process, budget churn and instability, excessive and changing
requirements. The Secretary also cited non-technical institutional issues: a risk-averse
culture, parochial interests, and adversarial relationships within DOD.

Secretary Gates continued to discuss the status of Acquisition by sharing his
frustration in addressing these challenges: "Since the end of World War II, there have
been nearly 130 studies on these problems – to little avail." (2009) The Secretary's
concerns seem to dismiss any need for further research on acquisition problems. While

not all of the studies are publicly available, several of the significant studies have been published by prominent researchers.

1.3.2 Chronology of Research and Practice

A survey of these publications reveals a trend. As the Services reconstituted themselves following the Vietnam War and focused on the Eastern European region to wage the Cold War, the economics of producing war-fighting systems dominated the analytical community (Fox 1974). Analysis of alternative system produced efficient frontiers for decomposing doctrine into roles for the functional battlefield operating systems. These trade-spaces could be explored with rigor and decisions could be made based on facts and empirical analysis by each of the services.

In anticipation of the Reagan "build-up," researchers started to look at defense industry dynamics and identified policy options at the DOD level, above the services (Gansler 1980). Ensuing tension across the different organizations was readily apparent nearly a decade later as researchers looked at the roles and responsibilities (Wilson 1989). Additionally, enforcement of Goldwater-Nichols Act affected many branches of government, with integrated services under the Joint Chiefs of Staff, inter-service operational commands defined by region and function, a Central Command, and a Special Forces Command for unifying the special forces units of individual services. (Hadley 1986) These organizational relationships were interesting to researchers and provided new insights into how the DOD operated, especially with regard to acquisition efforts (Wilson 1989) . As the decade ended, the defense world seemed to have diminished with the fall of the Iron Curtain and the cessation of the Cold War.

As military historians argued with political scientists about the end of history (Fukuyama 1992) or the future of war (Toffler and Toffler 1993), Army leaders sought to leverage the exponential advances in information technology to preserve capabilities developed from the successful acquisition during the build-up. (Sullivan and Harper 1996) This work recognized the possible benefits of advanced command and control approaches through information technology and acknowledged the institutional influences of organizations, such as dynamics presented in research of learning organizations (Senge 1990). Nevertheless, the interest in the physics of war-fighting seemed to attract less attention than new opportunities in information and command

(Metz and Kievit 1995) . Civilian and military leaders sought to replicate the revolution in information technology based in business affairs in the military, both the operational forces and in the Army's force-generating organizations.

In his keynote speech, Chief-of-Staff, General Shinseki (Shinseki 1999) outlined his vision for transforming the operational forces to ensure that operations other than war could be fielded within a "full-spectrum" combat force. Likewise, the logistical "tail" that supports the operational forces would be reengineered to sustain the future force's effectiveness and improve their efficiency. This vision was unparalleled in its complexity and risk due to technology's maturity levels, schedules, and costs. However, for an Army at peace without a peer competitor, all of its resources could be dedicated toward this imperative.

Not quite two years later, the terrorist attacks occurred on September 11, 2001. Then less than a year later, the U.S. Army was fully engaged in two theaters. Internal DOD tension was inevitable – especially the tensions between resource allocations to support for the ongoing conflicts or investments in the next generation of weapon systems. This was intensified by the significant changes proposed in the future force as it leveraged the full complement of "levers" (i.e., doctrine, organization, training, materiel, leadership, personnel, and facilities) to provide envisioned capabilities. Controversial issues among the functional branches (Infantry, Armor, etc.), units, and functional staffs ranged from headgear (berets vs. caps) to vehicle types (wheels vs. tracks) and ultimately the mission (high-intensity vs. low-intensity conflict). As this vision was implemented into its supporting objectives by subordinate organizations with their respective bureaucratic responsibilities, the transformational dynamics were diluted to evolutionary increments. As evidence of this, one of the major efforts was to improve the strategic deployability of the force. The division, the standard force package for the Army, was deemed too large and too heavy for rapid deployment. A new construct that leveraged the anticipated capabilities generated by the future combat system was the "unit of action." This brigade-size element was to have the footprint of about a third of a division but have the force-presence of the division. After planners, analysts, and respective branches added their requisite people and equipment, the unit of action nearly doubled the brigade size. This 50 percent reduction in size and equipment may seem impressive. However, the

non-direct fire systems that were usually attached at division level now were re-allocated to a separate unit of action headquarters; consequently, two units of action – a division combat unit and a non-direct fire systems unit not directly allocated to the division – still were required to deploy for combat operations.

After his recall from retirement in 2003, the new Army Chief of Staff, Peter J. Schoomaker assessed the status of the transition to the future force. Aware of the technical challenges occurring with the system development, Schoomaker focused on organizational approaches to generate capability. With the operations intensifying in Iraq, units were now rotating to sustain the necessary capabilities by using the Army's new Army Force Generation Model, championed by the Forces Command Commanding General Dan Kelly McNeill. This cycling of units demanded that Army leaders shift from the principle of war that the cold war favored – mass – to the principle of economy of force. These principles are not mutually exclusive or inversely related, as may appear on initial inspection: Economy of force typically allows a commander to mass his forces at the appropriate location while balancing his vulnerabilities in non-critical areas. The leadership not only recognized the principle of economy of force in terms of geography, but also in the dimension of time. Strategically, the Army had to sustain its production of capabilities. The need to cycle units, that is, respond to an active Army's more rapid deployment, led to the identification of modular (i.e., "plug and play") unit characteristics of units.

After nearly a decade, the Army has accomplished it conversion of brigades to the unit of action: these transitioned units are now designated as Brigade Combat Teams. The necessary standardization for integrating modular systems continues to be a challenge, but command agreements help to mitigate the situation. However, after the FCS program's initial budget of $92 billion grew to (by some estimates) $200 billion and its vehicles drew criticism for technological flaws and unresponsiveness to the lessons of combat in Iraq and Afghanistan, it was cancelled (Shachtman 2009) along with other major defense systems in 2009 as part of the DOD budget submission. This was not a surprise for anyone acquainted with recent studies of the acquisition system.

While most acquisition decisions focused on the required performance of the defense systems to be developed, DOD enacted a number of policy changes to strengthen

the acquisition process and leverage recommended system engineering solutions. These policy changes included replacing requirements that seemed to trap developers into infeasible solution sets -– or that prohibited innovative approaches – with capabilities that addressed the needs. Other initiatives redistributed program risk through changes in contract vehicles on a cost-plus rather than fixed-cost basis. To comply with legislation that required the establishment of professional military acquisition officers, the hierarchies of the program offices were filled with leaders who had been professionally developed specifically to manage the programs and execute the acquisition process. Further, these program offices were relocated directly under the service secretaries to ensure direct visibility and influence of the senior civilian leaders. Yet with all these significant policy changes, recent assessments indicate defense programs are experiencing increasing challenges and difficulties. A recent GAO report to congress by the Government Accountability Office, nearly two-thirds of the major acquisition programs were required to report cost over-runs. This is significant: A program is not required to report a cost over-run unless the amount of increase is greater than 50% of the baseline cost. Schedule is also significant: An average of nearly 23 months delay in providing initial capability (GAO 2009) . Leading researchers claim that policies that correct only the technical aspects of the Acquisition effort lack the holistic influence needed to improve acquisition (Sapolsky et al. 2009) .

1.4 Thesis Purpose

1.4.1 Domain Contributions

This research provides new insights regarding the sources of the acquisition issues that have been identified by Secretary Gates and other senior leaders. This study integrates previous competitive perspectives on the nature of the issues. It applies existing theory from multiple disciplines and generates new propositions to enable the greater community to understand the phenomena observed in the context of Army Acquisition.

1.4.2 Theoretical Contributions

This study identifies synergies among multiple disciplines and explains gaps or contradictions within accepted bodies of literature. While the next chapter will present

the review of existing literature, it provides presents the logic relating theory and practice to identify the gaps where contributions are necessary.

In order to answer one fundamental research question: "How does stakeholder salience influence value creation in a bureaucratic program enterprise?" this work provides a provisional theory by proposing new framework for linking the dynamic relationships that influence the acquisition enterprise. This framework will integrate two well known and accepted, and previously unrelated, frameworks for stakeholder salience (Mitchell et al. 1997) and value-creation (Murman et al. 2002). In order to establish this relationship, this work develops relationships by extending the Stakeholder Salience framework beyond identification and categorization of stakeholders, but establishes influence relationships of salience attributes to the perceived interactions of the stakeholders in the enterprise. This work also extends the Nightingale-Rhodes Enterprise Architecture Views (Nightingale, 2004; Rhodes, 2009) and integrates these views into this Dynamic Enterprise Engineering Systems framework.

1.5 Outline of the Dissertation

The outline of the dissertation will with this introduction provide the motivation for the research effort. Chapter 2 presents a review of the acquisition system in its current state and significant research efforts to help address the challenges. This chapter also reviews multiple disciplines that provide theoretical constructs that have been used or provide insights to the theoretical overlaps or gaps. This chapter also reviews multiple disciplines that provide theoretical constructs that have been used or provide insights to the theoretical overlaps or gaps, and traces the emergence of the value creation approach from Enterprise Engineering Systems as a means close the theoretical gaps, notably for application in defense acquisition enterprises.

To establish a basis for comparison of the existing and potential, the state of the current "open loop" defense acquisition program is depicted below.

Current

**System
Engineering**

**User
Requirement**   **Program
Advocacy**
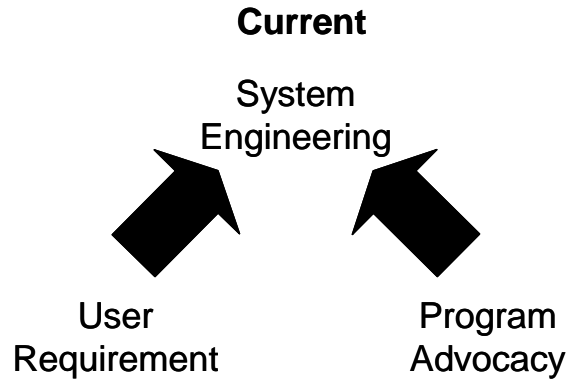
Figure 1-1 Current Program Enterprise Theoretical Basis

In the current defense acquisition process, Systems Engineering principles drive program management methods. However, based on findings in the multidisciplinary literature survey presented in Chapter 2, the following "closed loop" framework for defense enterprise is proposed:

Proposed

**Enterprise
Architecture**

**Value
Creation**   **Stakeholder
Salience**
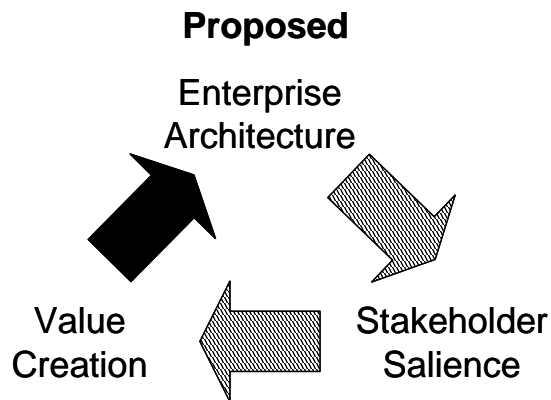
Figure 1-2 Proposed Program Enterprise Stakeholder Salience Influence

In Fig. 1-2, the open loop in Fig. 1-1 is modified to a closed-loop framework that includes value creation and enterprise architecture and allows for dynamic relationships among the three elements in the loop, and allows for varied stakeholders with significantly different purposes for their enterprise activity. These form the basis for the overarching research question.

Research Question: How does stakeholder salience influence value creation in a bureaucratic program enterprise?

Based on the literature review and the research question, the following initial propositions are considered to focus the research:

Proposition 1: The stakeholder salience attributes influence the enterprise program value creation process.

Proposition 2: The program enterprise architecture influence stakeholder salience attributes.

Chapter 3 develops the research methodology and associated logic based on the overarching research question and the initial set of propositions, Chapter 4 the first case, followed by the other two cases selected in Chapters 5 and 6. Chapter 7 presents the cross-case analysis. Chapter 8 examines the value of the provisional theory in terms of the policy implications within the research domain. Chapter 9 provides a brief summary of the research, identifies future opportunities for research, and provides some concluding thoughts about this effort.

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2 Defense Acquisition Analysis and Approaches

2.1 Literature Overview

The evolving literature of defense acquisition provides concepts and terms crucial to investigating the cases presented in this study, synthesizing the results, and considering how to close the gap between theoretical and practical approaches to optimizing defense acquisition, and developing the arguments for further work. This chapter presents a survey of the literature used in this report along with key terms and concepts that relate to ensuing chapters.

This overview begins with the existing Department of Defense acquisition approach termed the Lifecycle Management Framework. Using an overview graphic, the level of procedural control is evident.

To formalize the analysis, this work adopts the multi-discipline approach of engineering systems by drawing from the fields of engineering, management, and social science. From these fields, the analysis leverages the following theories:

- Enterprise Architecture
- Value Creation
- Stakeholder Theory
- Organization Theory and Bureaucracy

By contrasting and comparing these theories, an integrated framework is proposed for Program Enterprise Stakeholder Salience Influence.

2.2 Lifecycle Management Framework

The current result of efforts to systematically optimize DOD acquisition is most commonly shown rather than defined (Figure 2-1). It should be noted that the term *lifecycle management* is gradually replacing the term *acquisition.*

The depiction of lifecycle management in Figure 2-1 strongly conveys a sense of the complexity that can be expected during an acquisition program's lifecycle. For each process step, there are explicit entry and exit criteria with specified deliverables in terms of the system's maturity and organizational management information.
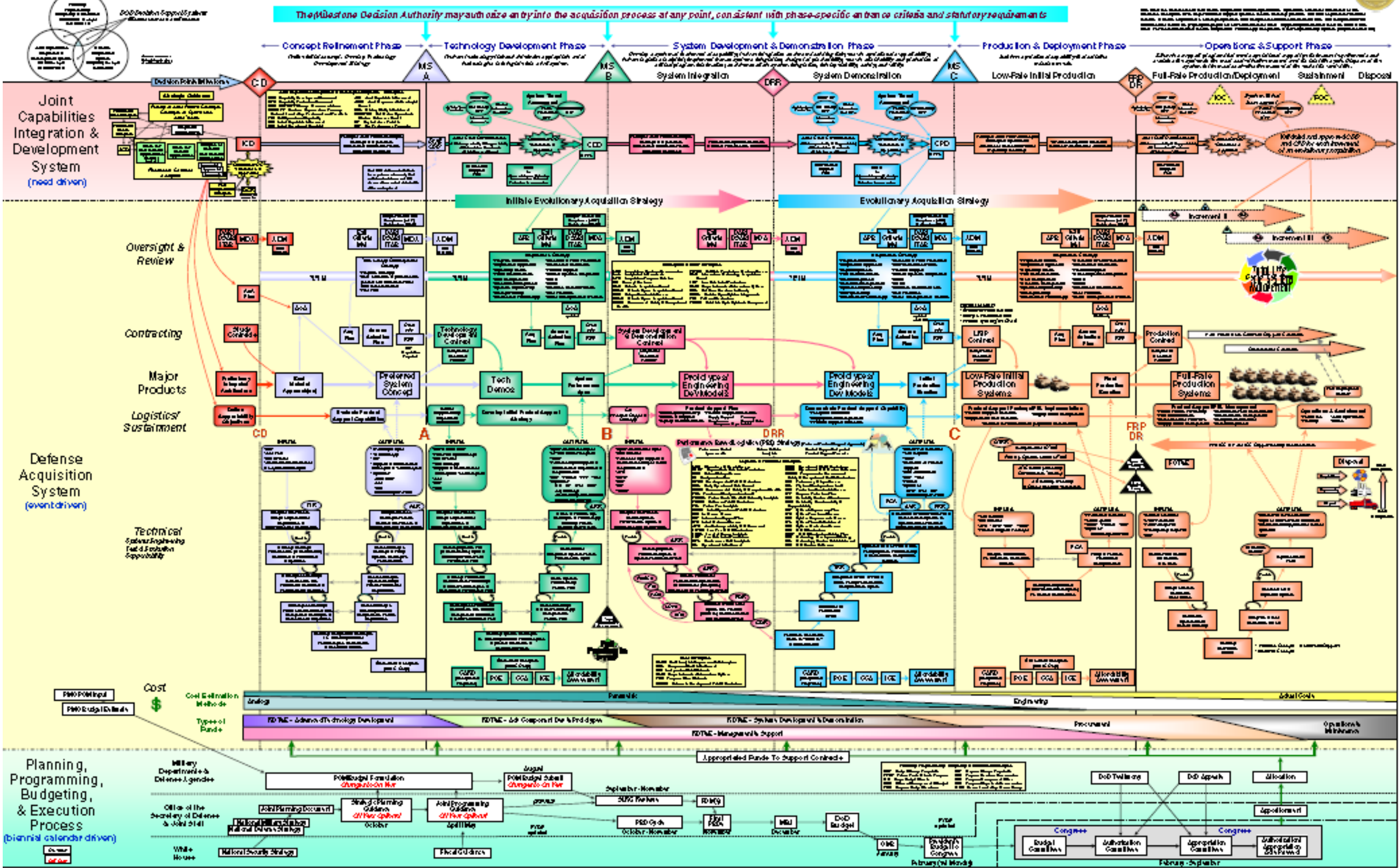
Figure 2-1 DOD Lifecycle Management Framework

As the elements shown in Fig. 2-1 are the result of the decomposition of the necessary process steps, Fig. 2-1 presents the high-level activities:
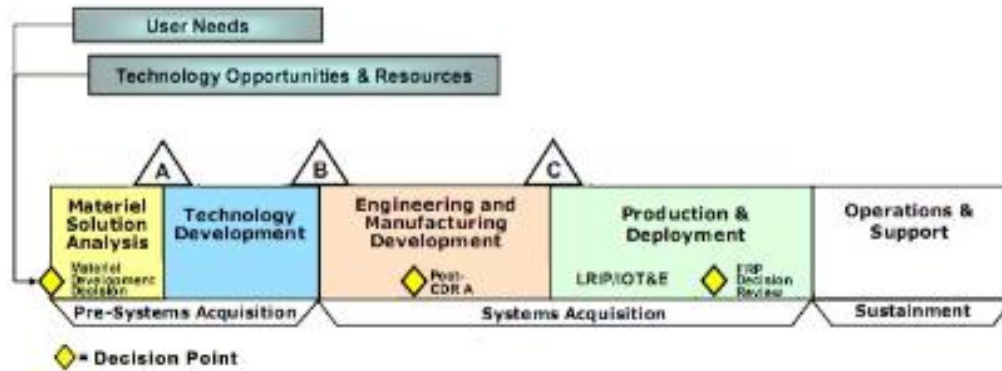
Figure 2-2 High-Level DOD Lifecycle Management Framework

This graphic is a good high-level representation of the lifecycle management activities. Based on the user needs (e.g., a combatant commander recognizes an inability of the force to accomplish a certain task to standard) and available technology maturity, the services constantly perform capability analysis to identify gaps and potential solutions while considering multiple perspectives: doctrine, organization, training, materiel, leadership, personnel, and facilities (DOTMLPF). The Milestone Decision Authority (MDA) serves as the decision maker responsible for considering all DOTMLPF elements to ensure a holistic overall solution is achieved. While the overall solution requires blending each DOTMLPF element, some may be weighted more heavily. This research effort focuses on materiel-weighted solutions but takes into account the interactions with other DOTMLPF elements.

Three decision points mark milestones in the lifecycle management framework. The decision for the validation of a solution that includes either primary or auxiliary materiel solution is a Milestone A decision.

In conjunction with identifying the capability need for the material solution, an assessment of the technology readiness is conducted. Based on an assessment of the readiness for implementation in the materiel solution, demonstrations are conducted and reported to ensure that technological risks are mitigated. With the successful

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demonstration of sufficient technology readiness, the MDA approves the Milestone B decision.

At this point, the material solution transitions from a "good idea" to a program of record with dedicated infrastructure and organization. The program of record is assigned to a Program Manager (PM) in a Program Executive Office (PEO) to manage the acquisition process activity. The PM not only leads the coordination of the engineering and manufacturing development activities according to the seemingly infinite statutes, policies and regulations, but also serves as the principle coordinator for both intra- and inter-service coordination teams, as required, and service-industry teams. This effort has been summarized as "trying to deliver the necessary capabilities to the war-fighter without ending your career and/or going to jail" during discussion with senior acquisition executives (Matty 2008). Once a limited-rate production has validated both performance and cost, the decision for full-rate production is given by the MDA for the milestone C decision. This results in the fielding and deployment for the material to units as planned and transition into the sustainment phase of the lifecycle. After the completion of the production and deployment and the start of the transition to the sustainment phase -- and depending on the approach for technology upgrades -- the program may be transitioned to a Product Manager (still aligned under a PM) to ensure coordination and management until system retirement.

Thus, the phasing of activities is program-centric, though DOTMLPF elements play into the solution. Every acquisition management system uses the program as the unit of analysis for aggregating management metrics, assessments, and feedback. In turn, the goal for the Army acquisition community is to ensure that all programs meet the quintessential system engineering metrics of cost, schedule and performance plan to ensure capability delivery.

2.3 Prominence of Systems Engineering

2.3.1 Background and Current State

One of the common texts provides a definition for Systems Engineering: "Systems Engineering is management technology to assist and support policy making, planning, decision making, and associated resource allocation or action deployment." (Sage 1992)

From its early development and adoption by the defense services at the conclusion of World War II, systems engineering has grown to be the fundamental discipline to shape defense acquisition (Grady 1995). Not only was systems engineering touted as having the capability to identify and integrate numerous complex requirements to support warfighter needs, the disciplined approach allowed for the integration of decomposed work structures in various locations and different organizations across the country working to develop materiel solutions. Eventually the DOD systems engineering process was standardized with a military standard, MIL-STD-499. In accordance with established regulations and policies, all systems were required to comply with this approach (DOD 1969). However, in 1994, then-Secretary of Defense William Perry issued a policy memorandum barring the use of military specifications and standards on DOD acquisition programs. Without a commercial systems engineering standard, the community of practice for systems engineering operated in good faith using the previous military standard as a baseline, while seeking to improve this technical process. As a result, a number of variations resulted in the practice of systems engineering and became increasingly fragmented across the DOD and its industry partners (Redshaw 2010). However, support for Systems Engineering was reaffirmed in the latest DOD policy documents:

> "Systems engineering provides the integrating technical processes to define and balance system performance, cost, schedule, and risk within a family-of-systems and systems-of-systems context." (DOD 1969)

2.3.2 Systems Engineering Critical Aspects

Based on the high-level and detailed systems engineering based acquisition process, there are three canonical phases: definition, development, and deployment (Sage and Armstrong 1999). The definition phase focuses on requirements, specifications, and preliminary conceptual design. The transition to the development phase, facilitated by the logical design and architecting, allows for detailed design and testing. The system begins to take physical reality with operational implementation, operational testing and evaluation and finally operation and maintenance (Sage 1992). As is often the case, continued research of engineering methodology has enriched this open-loop, phased approach for a richer engineering approach.

2.3.3 Engineering Systems

Multiple papers introduce the vocabulary of the field of Engineering Systems used in this study (Allen et al. 2004; deNeufville 2002; Moses 2004; Whitney et al. 2004). Moses (2004) identifies several features that distinguish Engineering Systems from other engineering fields:

- Emphasis on non-traditional properties: flexibility, scalability, safety, durability, sustainability, reliability, recyclability, maintainability, quality
- System characteristics: complexity, uncertainty, emergence, systems architecture
- System context: engineering systems, enterprise, societal-level

One of the primary focuses of this field is understand the system characteristics of which much can be ascertained by studying the influence of system architecture. System architecture is defined as "an abstract description of the entities of a system and the relationships between those entities," which is especially vital as "complex systems have behaviors and properties that no subsets of their elements have." (Whitney et al. 2004) This statement points out the contradiction prevalent in many applications of system engineering methods: the functional analysis, based on the deconstructionist approach, can define system performance through mutually exclusive, orthogonal functional decomposition. This consideration of system boundaries was prevalent in the efforts to consider the system dynamics of industries (Forrester 1961) and the explicit categorization of the system variables as endogenous, exogenous, or excluded (Sterman 2000).

The research that helped to develop this emerging field not only extends the field of engineering, but also integrates management and social science to produce a holistic theoretical contribution useful in capability analyses that integrate DOTMLPF solutions.

2.3.4 Enterprise Architecture Research

One of the primary domains in which Engineering Systems has "changed the world" is the study of extended enterprises (Womack et al. 1991). Nightingale and Rhodes (2004) state that "Enterprises are complex, highly integrated systems comprised of processes, organizations, information and supporting technologies, with multifaceted interdependencies and interrelationships across their boundaries." These views have been integrated to form a holistic enterprise architecture framework. (Rhodes et al. 2009)

. This enterprise architecture is comprised of seven views. The views and their definition are provided in the following table.

Table 2-1. Enterprise Architecture Framework Views (Nightingale and Rhodes 2004)	
View	*Description*
Strategy	The goals, vision and direction objectives of the enterprise with an emphasis on the business model and competitive environment
External Factors and Policies	The external regulatory, political and societal environments in which the enterprise operates
Process	The lifecycle, enabling and leadership processes by which the enterprise creates value for its stakeholders
Organization	The organizational structure as well as the relationships, culture, behaviors, and boundaries between individuals, teams and organizations
Knowledge	The implicit and tacit knowledge, capabilities, intellectual property collectively in the enterprise
Infrastructure/ Infostructure	The physical layer of the enterprise including real estate, facilities. etc., as well as the network systems and technologies needed to ensure resource availability.
Product/Services	The product architectures and the service architecture of the enterprise, including services as a primary objective or in support of products.

The work to understand a holistic systems approach for enterprise architecting, engineering and analysis has a rich provenance from other thought leaders as well.

One of the most influential researchers, educators, and practitioners of systems analysis was Russell Ackoff (Ackoff 1967; Ackoff 1981; Ackoff et al. 2006). After championing the inter-disciplinary approaches that lead to great successes and widespread adoption of the field of operations research (Ackoff and Rivett 1963), he continued to look at the synergy of scientific approaches to generate theory and apply this to address management challenges. One of Ackoff's key emphases was the appropriate perspective of the firm. While this work explicitly extends the analysis beyond the firm, it implicitly attempts to draw a defined boundary around this system with the term corporation, it proposes using an organization view based on the tenets that "an organization is a purposeful system, that is part of one or more purposeful systems, and parts of which, people, have purposes of their own." (1981) As a graphical representation of this view of the corporation, the following figure is provided.
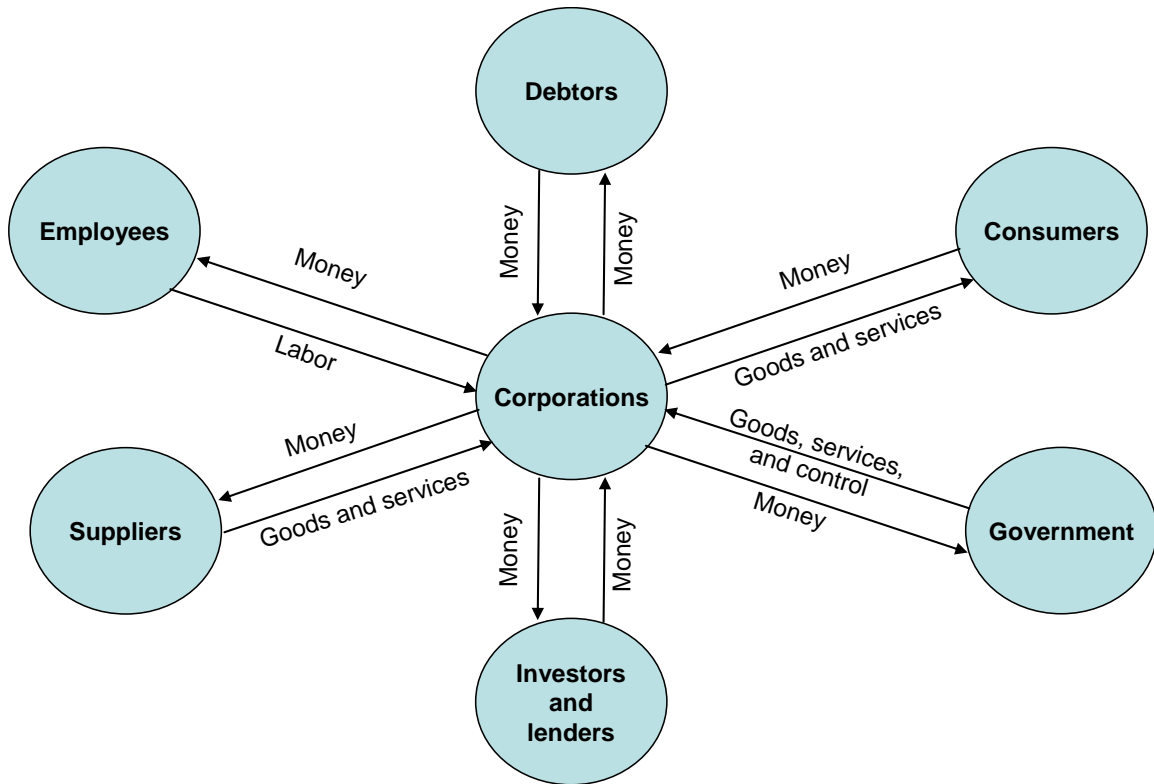
Figure 2-3 Corporation as an Organization (Ackoff 1981)

Several important characteristics should be noted in Ackoff's representation (Fig. 2-3): circles that represent the various categories of stakeholders, the stakeholders do not exchanges with other stakeholders, and the exchanges occur through the element of the corporation. This also establishes several implicit assumptions: the corporation is the center of the system interactions, the exchanges are explicitly defined (i.e., with money flowing only from the corporation to the suppliers), the list of stakeholders is explicit, and these stakeholders have generalized attributes (i.e., the same government for all corporations).

Continued work to develop a rich systems understanding are codified in the work to provide aerospace support for warfighters in U.S. Air Force acquisition efforts (Murman et al. 2002). Among critical contributions derived from this work is the introduction of a hierarchy that provides for three levels of enterprise: program, multi-program, and national/international. This is directly insightful for the context of this work within the Army acquisition efforts because the enterprise levels correspond organizationally to the Army Program Manager, Program Executive Office, and Secretariat Oversight. Murman makes the primary argument that enterprises exist to create value for all stakeholders.

Accordingly, the enterprise objective is not only to meet the value proposition for the customer (e.g., warfighter), but also to meet the value proposition for all other stakeholders (e.g., employees, suppliers, etc.) This also gives rise to the Value Creation Framework.

2.3.5 Value Creation Framework

The value creation framework was developed based on the analysis of the several enterprises within the Aerospace International Enterprise.
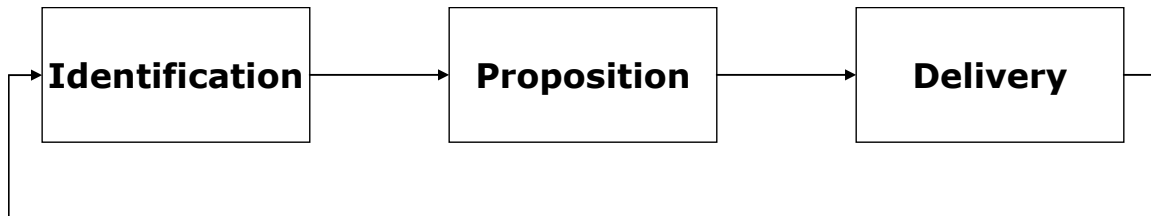
Figure 2-4 Value Creation Framework (Murman et al. 2002)

In studying the cases presented in Chapters 3-6 with a view to Murman's work, a framework emerged from the "lifecycle value" concept. Murman provides key indicators of a strong systems engineering basis. Moreover, the three phases he names extend the technical process focus of systems engineering into the socio-technical realm:

- *Definition (identification).* Most methodologies applied during the definition phase of systems engineering focus primarily on eliciting and translating the customer's needs into explicit requirements. This effort is challenging for several reasons. First, there is a presumption on behalf of the engineer that customers don't know what they need. This leads to a process of refining the stated primitive need into the vetted and approved effective need. This deliberate refinement of the purpose of the system is expanded in the value identification step. Not only are the customer's needs identified, but also other organizations are identified and included in the consideration of possible value exchanges. The assumption is that all relationships are bidirectional, even if the exchange is intrinsic. This value exchange potential greatly expands the list of organizations that influence the purpose of the system in a direct manner for its technical aspects, but also expands the consideration of other institutional impacts of the

system, lifecycle considerations, and other opportunities. This also enhances the ability to consider emergent system behaviors such as "unintended side-effects."

- *Development (proposition).* The development phase provides detailed architectures that are decomposed into components and then integrated through subsystems for overall system integration. Additionally, there is an explicit requirement for developing training support for users of the system. Contrasted with the value proposition process, the scope of this adjudication of design decisions is perceptively narrower. The value proposition is the decision making portion of the value creation framework. With the identified list of stakeholders and their value exchanges made explicit, multiple objectives, both complementary and competitive, can be analyzed. The methods necessary for these multiple-objective decision analyses are well developed theoretically and implemented in practice. (Keeney 1992; Kirkwood 1997; Saaty 1990)

- *Deployment (delivery).* The deployment is focused on the acceptance and realization of the benefits of the system by the customer or end-user. This is not a static phase for system maturity as up-grades or modifications may be provided as the system lifecycle design permits. The major effort for this phase is the maintenance of the deployed system. The value delivery phase directly contradicts the focus of the deployment phase by explicitly avoiding exclusive focus on any single stakeholder, as this would be "dysfunctional" for the enterprise (Murman et al. 2002). This is assured by direct engagement of the stakeholders in the enterprise activities as identified in previous phases.

The aspect of the comparison of the systems engineering phases and the enterprise value creation framework is the notion of the open loop system engineering and the closed-loop value creation framework. This demonstrates a fundamental extension of the system engineering approach with the characteristics as part of engineering systems. In particular, emergence and adaptability can be considered as part of this framework.

The preceding discussion seeks to highlight the precedence of using systems engineering and related systems analysis to advance the efforts to improve the field of engineering systems and also shows the opportunities for deepening the understanding of how these approaches can further be developed using a multi-discipline approach.

2.4 Management Science

Given the obvious impact that a pure systems engineering approach has in supporting management and social considerations, engineering systems explicitly seeks to integrate these aspects. As such, we revisit the motivation for this research effort, which is to address the existing challenges for the DOD to provide the necessary capabilities to the warfighter to accomplish the national military strategy. Many recent defense leaders have tried to strengthen the idea of support to the warfighters – even going so far as to refer to them as customers. The delivery of a capability thus represents the concept of value to the customer that involves many organizations.

2.5 Inter-Organizational Value Delivery

The Value Creation Framework (Murman et al. 2002), with its generalized approach of value (extrinsic and intrinsic) creation, is unique in engineering literature – calling for more than purely technical advancements that principally drive advancements in engineering. In contrast, management has focused on providing value. One model that had a profound early influence is the value chain. This model provides a framework for management to "disaggregate the firm into its strategically relevant activities to understand the costs and the existing and potential sources of differentiation."
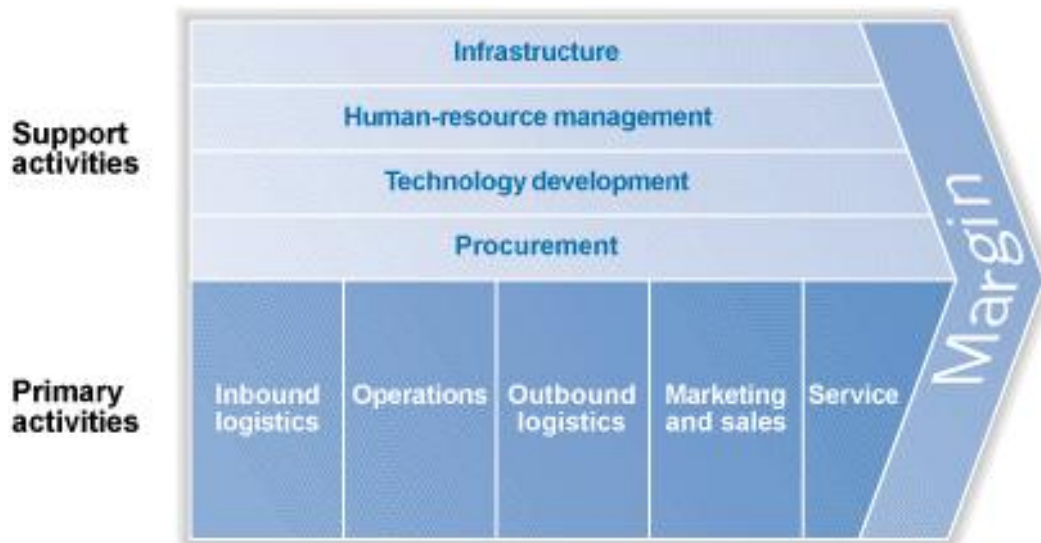
Figure 2-5 Value Chain Framework (Porter 1985)

This functional analysis of the firm provides a means that management science can apply well understood principles of economics to assess cost-benefit analysis to strategic

alternatives for competitive advantage. This approach brought clarity to the management practices with established process-based management approaches with predictable performance outcomes with such initiatives and supply chain management (Simchi-Levi et al. 2000), total quality management (Juran 1964), process management (Hammer 1996) and six sigma (Harry and Schroeder 2000). While these early efforts provided clarity and repeatability for analysis, the tradeoff was over-simplification through linearity and closed-systems thinking.

With new questions and hypotheses generated by research in the context of Japanese corporations, non-linear feedback and open, organizational systems thinking influenced new management theories (Womack et al. 1991). In particular, the study of the Japanese corporations points up the influence of inter-organizational relationships, both explicit and implicit across large-scope, multi-corporate value chains, considered not to be national/international enterprises. The study of inter-organizational relationship has been conducted through a number of theoretical paradigms. The following figure presents a spectrum for these paradigms spanning the reliance on two perspectives for analysis of economic to behavioral

Transaction Costs Economics	Resource Dependency	Strategic Choice	Stakeholder Theory	Learning Theory	Institutional Theory

Economic ⬅————————————➡ **Behavioral**
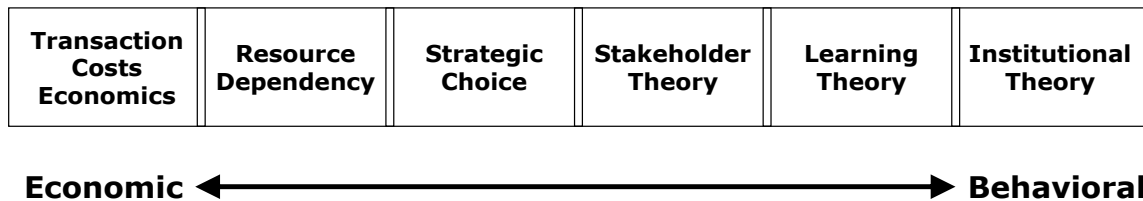
Figure 2-6 Spectrum of Theoretical Paradigms (Barringer and Harrison 2000)

This paper continues to present rationale for selecting a particular paradigm and states that stakeholder theory is not only "macro" but also opens itself to consideration beyond explicit agency-theory based relationships (Eisenhardt 1989) with the synergy of stewardship theory (Davis et al. 1997). This perspective has not been included in such paradigms as Transaction Cost Economics (Williamson 1994), Resource Dependency (Das and Teng 2000), or Strategic Choice (Jarillo 1989), but stakeholder theory also maintains balance on explicit contracts (Jensen 2002), while Learning Theory focuses

more on knowledge and Institutional Theory on external pressures on the firm. The next section continues to review the Stakeholder Theory Literature.

2.6 Stakeholder Theory

While the ideas of stakeholder theory was considered and discussed earlier (Ackoff 1981), the influence of stakeholder theory in management science is mostly attributable to the arguments supporting stakeholders in strategic management (Freeman 1984). This work was influential in that it provided for the identification of stakeholders and presented generalized relationships between a firm and its stakeholders. Based on this, management principles provided insights to develop methods/heuristics to address maximizing benefit for the firm. The following figure presents a framework (similar to what was presented earlier) to view the relationships of stakeholders.
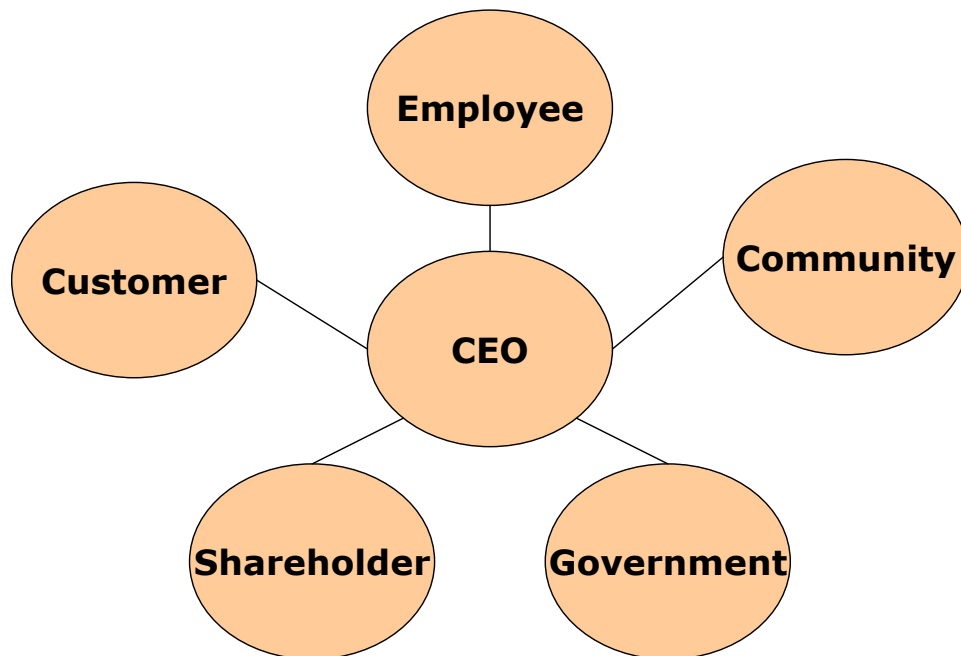
Figure 2-7 Firm Stakeholder Framework (Freeman 1984)

From this seminal work, stakeholder theory grew to address several lines of thought, presented in a literature review based on the next ten years of work (Donaldson and Preston 1995). The following figure presents the perspectives that stakeholder theory addresses.
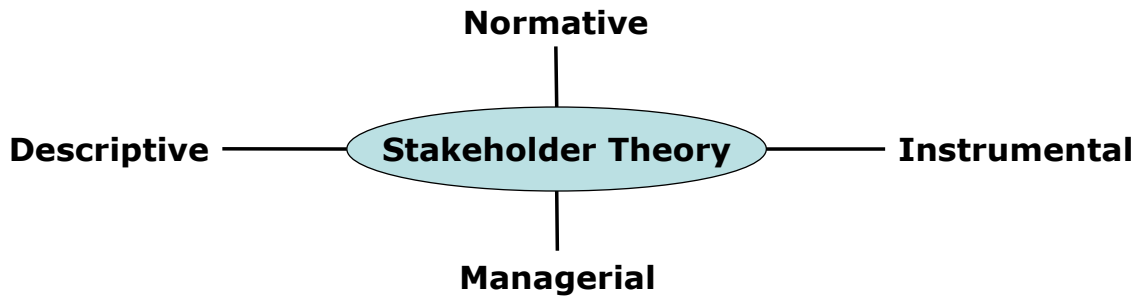
Figure 2-8 Four Perspectives of Stakeholder Theory (Donaldson and Preston 1995)

- *Descriptive* – Presents a model describing what the corporation is.
- *Instrumental* – Establishes a framework for examining the connections, if any, between the practice of stakeholder management and the achievement of various corporate performance goals.
- *Normative* – Stakeholders are identified by their interests, that is, their intrinsic value to in the corporation (whether the corporation has any corresponding functional interest in them).
- *Managerial* – Establishes organizational structures and general policies and employs case-by-case decision making.

This work framed research interests for stakeholder theory for the three phases of its development; however, the content of the literature provides several themes for future research contributions (Laplume et al. 2008). These themes are Stakeholder Definition and Salience (Mitchell et al. 1997), Firms Actions and Response (Rowley 1997), Stakeholder Actions and Response (Friedman and Miles 2002), Firm Performance (Clarkson 1995), and Theory Debates (Phillips et al. 2003). While this provides a convenient framework to position future work, the obvious issue is that these themes are not mutually exclusive. Given the holistic approaches used in the engineering literature and the influence of engineering systems on management, stakeholder theory in management science would benefit from having theory that begins to unify theses themes just as Donaldson and Preston called for addressing all their proposed perspectives.

2.7 Stakeholder Salience Framework

There are alternative views for stakeholders and their identification. Principally, these alternatives are based on categorizing the roles that the potential stakeholder may

have in their relationship from the perspective of a pre-determined firm much like the framework initially proposed by Freeman (Freeman 1984; Jawahar and McLaughlin 2001). However, other alternatives are based on meso-level categories (Friedman and Miles 2002).

From a systems analysis perspective, stakeholders are the components in a purposeful system. As different systems, enterprises have different purposes, a framework that does not assume roles, *a priori*, is necessary. A framework that uses fundamental stakeholder attributes allows for this type of understanding. A framework that is well accepted in terms of citations to form the basis of follow-on stakeholder research is the Stakeholder Salience Framework (Mitchell et al. 1997). This framework was developed to identify and categorize stakeholders based on their perceived salience by a manager in a given firm. The identification of a stakeholder is greatly dependent on the view applied to the criteria. This view spans a spectrum that can be called a narrow or broad view; where a narrow view is any entity that has placed something at risk with the firm while the broad view addresses any entity that affects or is affected by the firm (Mitchell et al. 1997). Additionally, one must consider whether the view is based on the actual or potential relationship, Mitchell, et al, argue that the potential relationships can be as relevant as the actual relationships. Salience is comprised of three attributes: power, legitimacy, and urgency. Power is defined as the ability to bring about the desired outcomes (Salancik and Pfeffer 1974). Legitimacy is "a generalized perception or assumption that the actions of an entity are desirable, proper and appropriate within some socially constructed system of norms, values, beliefs, and definitions," according to Suchman (1995). Urgency is defined as the degree to which stakeholder claims call for immediate attention (Mitchell et al. 1997). With the three attributes defined, the framework proposed (Mitchell et al. 1997) and follow-on research tested and concluded the existence of the relationship between the perceived level of the three attributes and stakeholders salience (Agle et al. 1999; Magness 2007). Also discussed was the fact that the attributes are not mutually exclusive, as depicted by the following figure.

Power

Urgency   **Legitimacy**
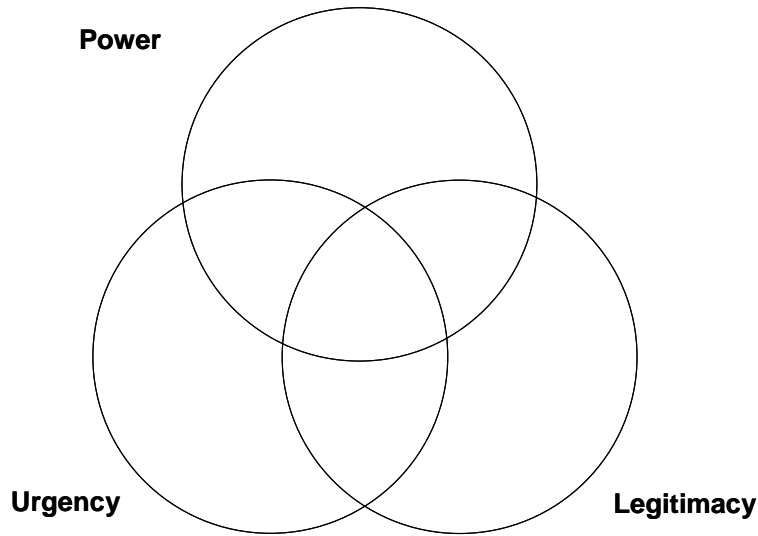
Figure 2-9 Stakeholder Salience Framework (Mitchell et al. 1997)

The perceived level of each attribute in combination with the other attributes leads to the classification of the stakeholders. The following table indicates the classification categories based on the combinations of attributes:

Power	Legitimacy	Urgency	Group	Category
Table 2-2. Stakeholder Salience Framework (Friedman and Miles 2006)				
Power	**Legitimacy**	**Urgency**	**Group**	**Category**
Y	N	N	Latent	Dormant
N	Y	N	Latent	Discretionary
N	N	Y	Latent	Demanding
Y	Y	N	Expectant	Dominant
Y	N	Y	Expectant	Dangerous
N	Y	Y	Expectant	Dependent
Y	Y	Y	Definitive	Definitive

The groups are in order of "increasing" salience with the respective categories depicted within each level of the group. It is interesting to note that while Mitchell, et al, discuss the "change in momentum" from the perception of only one attribute to a stakeholder with two, however this shift has been translated into a tree-like hierarchy of the groups in following literature (Friedman and Miles 2006). By mapping Latent to Low Priority, Expectant to Moderate Priority, and Definitive to High Priority, this attempt to linearize the framework does not account for the dynamism, a central focus of the framework, where a stakeholder can gain or demonstrate other attributes. This

overall categorization approach serves to balance the broad and narrow views on stakeholders by narrowing or classifying the initial possible meaningful stakeholders.

Later work sought to refine the practice of stakeholder management, using a network-based model with prioritization "weights" derived from a constructed a metric for stakeholder salience, the "stakeholder salience index." The network approach was offered in the context of an enterprise en lieu of a firm centric approach (Grossi 2003). This metric is constructed by decomposing the attributes into subtypes, scoring the stakeholder candidate on an ordinal ten-point scale, and aggregating the scores with a function to capture the relationship between the three attributes. The protocol for collecting the scores is through the administration of a survey to selected stakeholders. (See Chapter 3) This again simplifies the practice of stakeholder management with a repeatable and reproducible metric, but loses the fidelity of the attributes and their dynamic impact on the enterprise dynamics (Matty et al. 2008).

2.8 Social Science

Social Science and the study of public policy provide a general context for the role of defense acquisitions in how the United States organizes for defense (Sapolsky et al. 2009). However, social science also examines the organizational theories that help understand how organizations are designed and how they interact internally and with each other. This need was recognized by systems analysts as understanding the "internal political system" (Ackoff et al. 2006). It is through the study of politics and interactions of the various constituencies that the parallels of stakeholders and interorganizational relationships gain valuable insights.

2.8.1 Organization Theory

Similar to systems thinking that lead to establishing the firm as an organization (Ackoff 1981), organization theory proposes the organization as a system (Kast and Rosenzweig 1973). This system is comprised of a number of interconnected subsystems (Daft 1989) much like the systems views that describe the enterprise architecture (Nightingale and Rhodes 2004). Organization Theory has evolved much like systems theory from its traditional deconstructional approaches (Weber 1946) to a more connected typology (Gulati et al. 2000).

2.8.2 Bureaucracy

Merriam-Webster (2009) gives the definition of bureaucracy as "government characterized by specialization of functions, adherence to strict rules, and a hierarchy of authority." While the term bureaucracy has developed a strong negative connotation (Wilson 1989), the following discussion will adhere to the definitions contained in the literature. Weber states that there are six characteristics of bureaucracy:

1. There is the principle of fixed and official jurisdictional areas which are generally ordered by rules that is by laws or administrative regulation.

2. The principles of office hierarchy in the levels of upgraded authority mean a firmly ordered system of super insubordination in which there is a supervision of the lower offices by the higher one.

3. The management of the modern office is based upon written documents which are preserved in their original or draft for.

4. Office management at least all specialized office management-in such management is distinctly modern-usually presupposes thorough and expert training.

5. When the office is fully developed official activity domains the full working capacity of the official, irrespective of the fact that his obligatory time in the bureau may be firmly delimited.

6. The management of the office follows general rules, which are more or less stable, more or less exhaustive, in which can be learned. These characteristics combine in the management archetype that ensures that establishment of each office (organizational entity) has a specific purpose, authorities and level in an organization construct that is explicitly codified in documentation. Advantage of technology and the changes that were clearly possible.

(Natemeyer and McMahon 1989)

2.8.3 Dynamic Open Organizational Systems

The bureaucracy characteristics identified by Weber implicitly insulate the closed system bureaucracy (Thompson 1967) from the dynamic stresses that change and adapt organizational systems (Cyert and March 1963). This inclusion of the behaviors and their systematic effects opened new approaches to understanding organizational processes (Simon 1997) and how these behaviors tied multiple subsystems together. However, as contingent theories for organization were developed, the management archetype of bureaucracy continued to be the prevalent implementation (Nohria 1991).

Continued research into bureaucracy found that bureaucracy was not a static closed system, but could evolve, as open systems must in order to accomplish the tasks required of the organization in an uncertain environment. It also emerged that solutions are actually incompatible to the bureaucracy, such as those identified by Wilson (1989):

- *Accountability* – Getting agencies to serve-agreed-upon goals
- *Equity* – Treating all "citizens" fairly
- *Responsiveness* – Reacting reasonably to the special needs of a particular group of "citizens"
- *Efficiency* – Obtaining the greatest output for a given level of resources
- *Fiscal Integrity* – Assuring that funds are spent prudently for the intended purposes

The challenge to find synergy among these challenges helps not only drive the behaviors of the existing bureaucracy but also forces to expand the bureaucracy as additional processes are added to control and manage these requirements (Wilson 1989). This updated bureaucratic-behavior theory can be generalized to understand how the organization does not grow without bound.

2.8.4 Defining the Organization

Each organization, in general, is established on the premise of differentiation and integration (Lawrence and Lorsch 1967). Taylor and Weber both sought to capture the industrial efficiencies and advancements due specificity in the task environments. As firms grew larger and evolved into corporations, there was a qualitative difference in the work done at different levels – leading to the recognition of three levels of responsibility and control: technical, managerial, and institutional (Parsons 1960). While the hierarchical relationships can dominate the research (Jaques 1989), the interest of the relationships allow a broader context for less explicit ties (Gulati and Kletter 2005). Nohria espouses that that there are three organizational forms: Functional, Divisional, and Hybrid. (Nohria 1991) However, in later work, this perspective is out-scoped to industry level with the idea of networks as a form (Gulati et al. 2000). Again, the interdisciplinary convergence is apparent when organizational structures are compared to boundaries of the three levels of enterprises previously presented (Murman et al. 2002).

2.8.5 Integrating the Organization

Defining the organization is necessary for understanding the central concepts of organizational structure, but not sufficient. How the organization is integrated must also be considered. With inherent efforts to have mutually exclusive task environments for component sub-organizations in a bureaucracy, there is a need for integration. This is effort is usually requires separate integration organizational components (Lawrence and Lorsch 1967). However, we see that this need for integration is met with a balancing dynamic in that components in a bureaucracy strive for autonomy to maximize their task accomplishment (Wilson 1989). Internal efforts to control the exchanges between organizations are a general characteristic with significant effort expended (Thompson 1967). How these dynamics are balanced is dependent on the normative perspective that is central from stakeholder theory. It is important to note that the normative aspect is not completely based on the agency theory (Eisenhardt 1989) but has strong implications from stewardship theory (Davis et al. 1997).

2.9 Implications for Research

Comparing and contrasting these multiple disciplines provides a holistic perspective on the main themes for the study of the program enterprise in the bureaucracy of the Department of the Defense. In each respective body of knowledge, there are few gaps; however, when a multi-disciplinary view is used, we find that the value creation approach from enterprise engineering systems superficially leverages the maturing management theories of stakeholders. The effort to close this theoretical gap is reinforced both specifically to the problem domain in the DOD and in generality for non-DOD organizations. To establish a basis for comparison, the current state of the defense program is depicted below:

Current

System
Engineering

User
Requirement
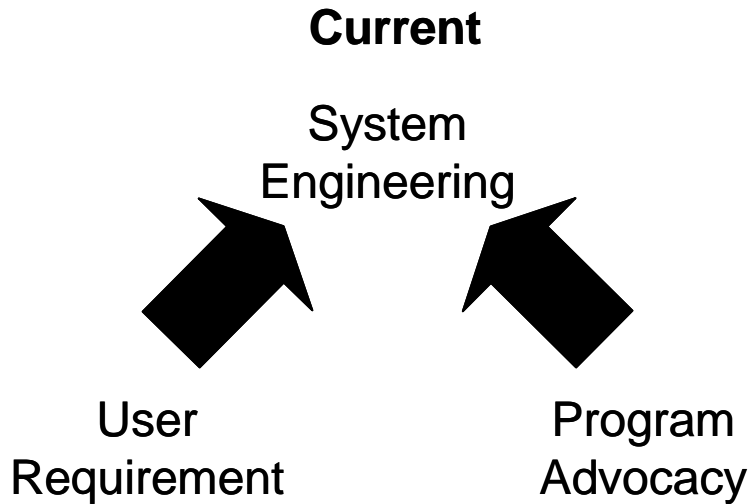
Program
Advocacy

Figure 2-10 Current Program Enterprise Theoretical Basis

From the previous discussion, there are significant gaps that can be addressed using a multidisciplinary approach. From engineering and social science, the following assertion is made: a defense program is comprised of a number of varied stakeholders with significantly different purposes for their enterprise activity (Fox 1974; Gansler 1980; Murman et al. 2002; Sapolsky et al. 2009; Wilson 1989). A stakeholder's influence on the program enterprise varies longitudinally and when compared to other stakeholders (Agle et al. 1999; Allen et al. 2004; Barringer and Harrison 2000; Forrester 1961; Freeman 1984; Gulati and Kletter 2005; Jawahar and McLaughlin 2001; Mitchell et al. 1997; Nightingale and Rhodes 2004; Thompson 1967). The purpose, both stated and implied, for a system is the fundamental consideration for the system lifecycle, including organizational system (Ackoff 1981; Gulati and Kletter 2005; Jensen 2002; Murman et al. 2002; Nightingale and Rhodes 2004; Nohria 1991; Redshaw 2010; Sage 1992; Sage and Armstrong 1999). Based on these assertions, the following framework is proposed for this research effort.

Proposed

Enterprise
Architecture

Value
Creation

Stakeholder
Salience
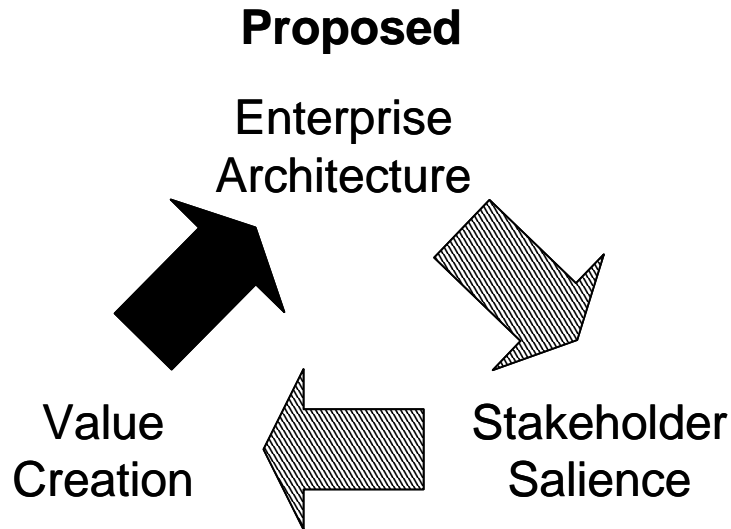
Figure 2-11 Proposed Program Enterprise Stakeholder Salience Influence

This framework depicts several key aspects. Leveraging the broader, more general theoretical basis, user requirements and program advocacy are extended to value creation and stakeholder theory respectively. The open loop "thinking" is modified to a closed loop framework; thus, stakeholder theory, value creation, and Enterprise Architecture are translated from exogenous considerations to endogenous factors that must be included in the systems analysis of the program enterprise. This also explicitly asserts the existence of dynamic influence relationships between the three perspectives. These form the basis for the overarching research question and propositions presented in Chapter 1 that serve as the basis for the development of the research methodology presented in the next chapter.

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3 Methodology

3.1 Research Design

3.1.1 Methodological Fit

There are four elements to a research project: research question, prior work, research design, and contribution to the literature (Edmondson 2007). The research questions provide focus and scope for the effort. The prior work indicates the state of the research area and enables identification of theoretical gaps and contradictions through a review of relevant literature. This exercise informs the researcher where the question falls on the continuum of nascent to mature theory. Based on the level of theoretical maturity, researchers have an expectation of these four elements based on three archetypes of methodological fit.

For this particular research effort, the literature revealed that the theoretical opportunities demonstrate an intermediate level of maturity. The research questions propose relationships between new and established constructs. The type of data that should be collected is hybrid (both qualitative and quantitative); data will be acquired through interviews, surveys, observations. It will be subjected to content analysis, exploratory statistics, and preliminary tests. The analysis will support a provisional theory that integrates previously separate bodies of work.

As part of the literature review, several inter-organizational relationship research project methodologies were reviewed and categorized in the following table:

Figure 3-1 Stakeholder Theory Research Methods
Survey
Clarkson, 1995; Carmeli, et al, 2007; Gulati & Kletter, 2005; Agle, et al, 1999, Magness, 1999
Regression
Lunnan & Haugland, 2007; Barton, Hill, & Sundaram, 1989; McGuire, Sundgren, & Schneeweis, 1988; Preston, Sapienza, & Miller, 1991
Interviews
Kotter & Heskett, 1992; O'Toole, 1991; Gulati & Singh 1998
Decision Analysis
Keller, et al, 2009; Templin, 2004

These approaches were consistent with the expected archetypes given the methodological fit. While survey methods were the mode followed by Regression (of quantitative corporate data), preliminary assessments of public data available were limited to principally ordinal scales or qualitative assessments, such as those found in the Probability of Program Success Assessment and lacked dimension and the richness needed for developing new insights. Based on the elements to ensure methodological fit, the next section presents the research method selected.

3.2 Case Study Research

3.2.1 Methodology Logic

Based on the methodological fit previously discussed for Intermediate Prior Theory, the research method was informed by further consideration of the following conditions for application of case study methodology: form of the research method, control of behavior/events, and focus on contemporary events (Davenport 2009). Given that the research questions were structured to understand "how", the selection was not necessarily limited. However, due to the limited control of the behavior/events, designed experiments were not feasible. Also, control over the variables was critical given the diversity across programs. The perceived considerations of systems that support a capability through employment of a particular battlefield operation system provided great diversity among the more than 500 Army programs. Last, the relative availability of contemporary events was present; however, the span of time for events to occur must be considered; the behavior/events for a program typically spans multiple years. Based on these additional considerations, Case Study was selected over survey, archival analysis, history, or experimental.

There are five components for the research design for case study: the study's question(s), case proposition(s), unit(s) of analysis, logic linking the data to the propositions, and criteria for interpreting the findings.

3.2.1.1 Study Questions

Based on the preceding discussion, the study questions were a principal consideration for selecting case study. The structure of the question that was generated by the literature review strongly supports this decision.

3.2.1.2 Case Propositions

The literature that supported the development of the study questions also supports the development of the case propositions. Based on the theoretical framework established in Chapter 2, there are two principle propositions that will serve as the basis for the case study. These are presented again:

      P1: The stakeholder salience attributes influence the enterprise program value creation process.

      P2: The program enterprise architecture influence stakeholder salience attributes.

3.2.1.3 Unit(s) of Analysis

The question of defining the unit of analysis is related to the definition of a case. As previously discussed in the literature (Murman et al. 2002), there are three levels of enterprise: program, multi-program and national/global. Based on the questions and propositions, an initial consideration is to examine an enterprise at the program level. Based on preliminary data collection efforts, all data is focused on the program level as well. It followed that a case would be defined as a program. To continue the relationship between the definition of the unit of analysis and the definition of a case, the following graphic is used:
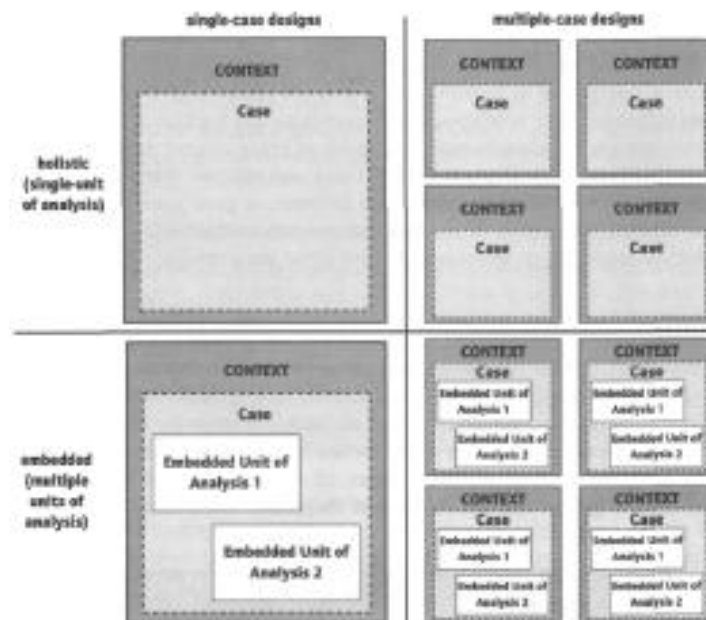
Figure 3-2 Alternative Case Study Designs(Yin 2009)

As mentioned in the methodology logic, programs in the Army are aggregated into a battlefield operating system that addresses one or more needed capabilities. This relationship of the battlefield operating system and the capability provides a more concrete construct for the context of the case. Based on the propositions, it was evident that the unit of analysis would have to be at the stakeholder level. This did not preclude comparing and contrasting the relationships among stakeholders at the program-level, but primary analysis was at the stakeholder (organizational) level and its interaction within the program, as part of the battlefield operating system for a capability.

Adapting the over-arching methodology approach from different texts and publications on research methods, the following diagram was developed to portray the case study method adopted (Babbie 1979; Edmondson 2007; Eisenhardt 1989; Fowler 1995; Fowler 2009; Yin 2009).
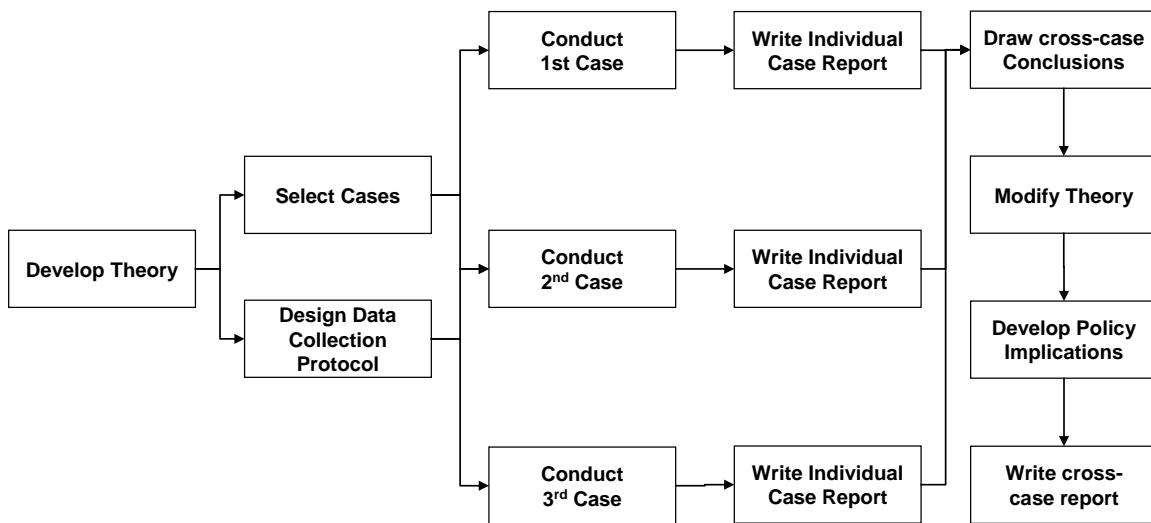
Figure 3-3. Adapted Overarching Case Study Methodology

3.2.1.4 Logic to Link Data to Propositions

Initial assessments were made on the type of data that was available at the program enterprise level for both quantitative and qualitative data. Access to the data was consideration as well, however with the support of senior U.S. Army leadership, access was ensured given the researcher used appropriate consideration for classification and distribution. While the data that was available would help inform the research about the initial propositions, it was determined that more direct data collection was necessary.

As depicted in Figures 2-10 and 2-11, the influence of value creation on the enterprise architecture is established. This approach is prescriptively provided through existing policy in the form of the DOD 5000 series (DOD 2007). The proposed framework reverses the exogenous relationship of enterprise architecture on the stakeholder salience. Likewise, the framework proposes to research the influence of stakeholder salience on value creation, which is currently excluded in the literature. This is a significant step in the instrumental aspect of the stakeholder salience framework insights to stakeholder theory. Without existing program data that explicitly or implicitly measures these two new influence relationships, this research adapts and extends existing protocols and tools for stakeholder salience. As will be discussed below, based on the interest in influence of the framework relationships, an interview protocol was developed.

The previous research considered the contributions of the salience attributes to the overall salience of typical stakeholder groups (Agle et al. 1999). For the purpose of this study, the following figure illustrates three of the nine relationships between stakeholder salience attributes and value creation processes:
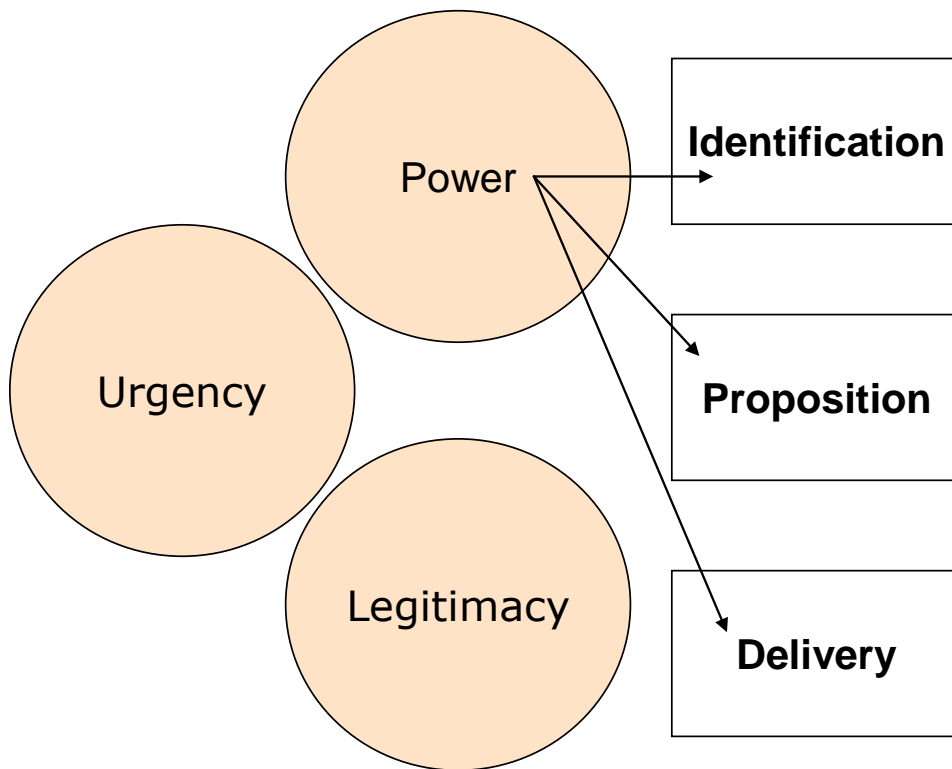
Figure 3-4 Influence of Salience Attributes on Value Creation

This approach can be extended for Proposition 1 as part of an administered question during the interview protocol using a Likert Scale with a "declarative statement followed by a response options that indicate varying degrees of agreement with or endorsement of the statement." (Devellis 2003) The following question and response options (Siegle 2008) were presented as part of the interview.

> The influence of <salience attribute> on <value creation process>:
> +/- Unimportant
> +/- Of Little Importance
> +/- Moderately Important
> +/- Important
> +/- Very Important

While superficially the question and direct assessment afforded a simple response that could be easily recorded, the respondents were asked to develop the data. This was accomplished using the following approaches (Weiss 1994):

1. Extending

2. Filling in detail

3. Identifying actors

4. Others the respondent (would) (consult)ed

5. Inner events

6. Making indications explicit

The second proposition did not have precedence in literature due to proposing a converse relationship to previous assertions (see Figure 2-10). However, in previous research, the stakeholder identification and categorization efforts where typically justified by respondents using the various enterprise architecture framework views without prompting (Matty et al. 2008; Matty et al. 2007) while using a stakeholder salience assessment questionnaire (Grossi 2003). Again by extending the respondents answers to the questionnaire, the respondents provided details such as examples, events, etc. to justify their assessment of the salience attributes, and additionally, what could be changed to influence the perceived stakeholder's salience. This approach allowed for the necessary data to be presented without influencing the responses with predetermined and avoid response bias. This data would allow for an assessment of the influence of

enterprise architecture (Nightingale and Rhodes 2004) on the sub-attributes that aggregate to the salience attributes (Grossi 2003).

3.2.1.5 Criteria for Interpreting Findings

The logic applied to link data to the propositions, permits direct testing of the hypothesis using ordinal and categorical data analysis techniques. Without the precedence of previous statistical models, non-parametric analysis techniques were used with the level of significance selected as 0.05. While a level of significance of 0.01 is more common using parametric analysis, the higher level was selected to account for a reduction in the tests' power from both a methods standpoint as well as the sample size of stakeholders within each case (Conover 1999).

Other steps were taken to mitigate bias. During the data processing of the qualitative data, the coding schemes were documented and were tested for repeatability and reproducibility using graduate students that had received formal instruction on separate frameworks for both the definitions and existing applications of the theories. The feedback from these procedures provides confidence of appropriate steps to mitigate bias and increase internal validity during the data analysis. Other procedures were developed as well and will be discussed as part of the collection and analysis protocols.

3.3 Case Selection

Based on over-arching case study approach, preliminary research about various capabilities, battlefield operating systems, and programs was conducted. While there were many programs that were at various states of lifecycle development, the capability for "conduct aerial reconnaissance" in the aviation battlefield operating system had three active programs operating near simultaneously for the attack-scout helicopter program management office. This was a unique research opportunity as most program offices have one typically in the retirement phase while a second is in development. These cases were very strong candidates based on the approach that "replication, not sampling logic, is used for multiple case studies." (Yin 2009)

While all programs follow the same generalized lifecycle management process identified by the upcoming or most recent milestone decision (DOD 2007), there are factors to be considered. One is the Acquisition Category (ACAT) which determines the decision authority, whether at the DOD, Service, Program Executive Office level and if

authority may be delegated to other government officials. The acquisition strategy determines the program structure to achieve the required capability, whether it is evolutionary (incremental) or single-step (typically utilized in conversion for "commercial, off-the-shelf," available solutions). In many programs, there is a lead that is responsible for integration of different engineering and development efforts. Typically in system acquisition a primary contractor (COM-LSI) is selected that manages sub-system and component integration with "sub-contractors" supporting the effort. However, in other cases the government may select to leverage internal system engineering management expertise (GOV-LSI).

The three candidate cases were reviewed. The results are presented in the following table:

Table 3-1. Candidate Case Factors			
Program	Milestone	ACAT	Strategy/Lead
1	Post MS-C	II/III	Single/GOV-LSI
2	Pre-B	II	Single/COM-LSI
3	Pre-B	II	Single/GOV-LSI

Program 1 was very late in the lifecycle, Post Milestone C, and had been considered for retirement from operation. Program 1 had initially before ACAT-levels were established, but using current standards would have been ACAT II. However, based on the maturity of the program and decreased development funding, it was categorized as ACAT III. This was significant from a research standpoint as there are very few periodic reports required for an ACAT III program and its financial resources were not explicitly delineated in budget categories. Due to its maturity, there were few research and development actions in the program, which allowed the government to maintain lead system integration responsibility.

Program 2 was much more significant in terms of the reporting requirements due to oversight requirements placed on an ACAT II system program very early in the lifecycle, pre-milestone decision B. While this would provide specific data, both quantitative and qualitative, this data would not be available for the other cases for direct cross-analysis. With the selection of adapting an existing commercial, off-the-shelf material solution, the primary commercial developer was placed in the role as Lead System Integrator.

Program 3 was also very early in its development, pre-milestone B, and also had explicit reporting requirements placed on it as it was an ACAT II program. This program was using an adaptation of an existing military system; this prompted the program office to assume LSI-responsibilities.

The high-degree of replication extended beyond these typical program factors in that as a result of the similarity in the battlefield operating system, many of the functional elements in the Army would be similar. This translated to expected consistency among all possible stakeholders as aviation capabilities were handled by the same offices in the Department of the Army Headquarters, Army Commands, Program Executive Office, and even the same commercial organizations. Again, this was a unique instance of case replication within the same context.

3.4 Design Data Collection Protocols

Several research efforts, (Matty et al. 2008; Matty et al. 2007) used surveys protocols (Grossi 2003; McNutt 1998) which provided quantitative information; however, during the administration of the survey, the respondents provided qualitative data about the basis for their survey responses. Based on this consideration, the survey instrument was used to form the basis of the interview protocol. The following protocol was then developed and conducted for the three cases:

- Develop initial list of candidate stakeholders using program documentation (e.g. reports, meeting participation, distribution list, etc.)
- Identify POC in candidate stakeholder organization (e.g., Program Manager, Lead Analyst, Action Officer)
- Provide survey instrument for review and schedule initial phone call.
- Administer survey for self-assessment, record conversations. For each factor, respondent selects appropriate score and provides justification. Specific examples requested (instructed that example should be of typical behavior, not outlier.) Other requested assessments are reviewed to identify any issues of non-familiarity. Follow-up phone call is scheduled.
- Respondent completes other requested assessments.
- Follow-up phone call is conducted with discussion of other assessments and justifications providing extended data verbally. (Note: In addition to current

perceived salience score, also collected is ideal salience attribute scores for self assessment)

- Respondent questioned about salience attributes influence on value creation.
- Recordings are transcribed and provided for verification to respondent.

3.5 Collect Data

Following the protocol described, the data collection plan was developed. With a relatively high number of stakeholder candidates and limited time with the points of contact, a sampling plan was developed. Using a lattice sampling approach (Abbey 1978) the study spanned all stakeholder candidates without significant loss of statistical significance.

The stakeholder candidates initially conducted a self-assessment for their stakeholder salience attributes as part of the initial interview. This allowed for the interviewer to clearly articulate the definitions for the terms in both the stakeholder salience and value creation. With the consistency for the definitions established, the respondents would assess the perceived level of the salience attributes using the scales set forth in the survey. The data was then extended by requesting the rationale for the score. This allowed for the data extending approaches previously mentioned. The respondents would then provide an assessment for specified other stakeholder candidates. For illustration of this stakeholder lattice sampling approach, stakeholder S01 conducts assessments on S01, S05, S16, S20, S23 as indicated in the following figure:
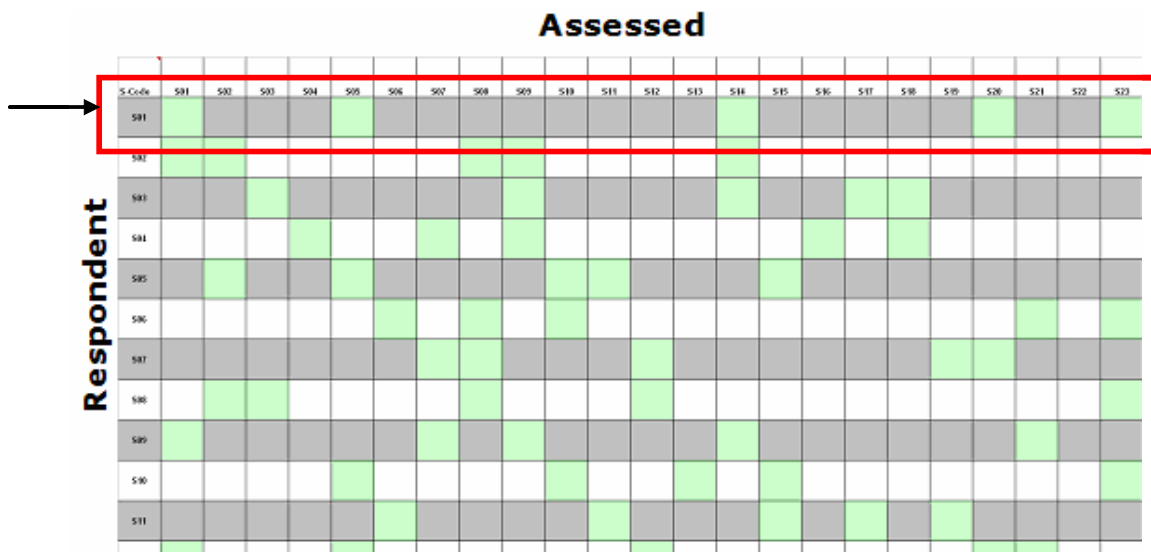
Figure 3-5. Lattice Sampling for Stakeholder Assessments

The assignment of stakeholder assessments was random, except for the self-assessments, using an algorithm developed by the author in visual basic. This approach is very efficient if the population is well defined in advance, which in this context, all stakeholder candidates are identified in advance. As part of the initial coordination, a list of stakeholder candidates was provided to all known respondents with the request to provide additional candidates as deemed necessary by the initial subset of stakeholders. Specific results of this effort will be presented in each of the cases.

The results of this lattice sampling approach included data collection from candidates that later determined to demonstrate salience attributes that would result in their categorization as stakeholders and non-stakeholders. Additionally, these approach restricted collection to only those candidates that explicitly interacted with the program enterprise for the respective case. During the coordination for the list of candidate stakeholders, stakeholders would not provide assessments on other stakeholder relationships without explicit knowledge of the relationships of candidates and the enterprise. While this internal perspective may be considered a possible source of bias, the functional organizational structure of the DOD ensures that many of the candidate stakeholders are potential stakeholders in many program enterprises and were able to differentiate between the relationships in one enterprise and others. This understanding actually reinforces the validity of the data collected.

As stated, the basis of the interviews was the survey instrument that captured the stakeholder attribute assessments. The extended data was captured by recording the responses and transcribed. The extended data was the critical data that would provide the insights for the influence relationship for the proposed framework.

3.6 Analyze Data

3.6.1 Within Case Analysis

3.6.1.1 Data analysis for influence of stakeholder salience on value creation.

Based on the self-assessment of the respondent, the explicit question was proposed to ensure the linkage of the data to the propositions. This explicit feedback used the Likert scale as discussed. The data was not assumed to follow an explicit distribution

requiring nonparametric statistical analysis techniques. This would be test to verify this assumption. The data analysis for this influence relationship was conducted in two steps. The first step was to test the independence of the value creation and stakeholder salience attributes. Statistically, this is accomplished with the null hypothesis that all nine influence scores represent a different sample and that each sample would have the same median if independent. It is important to note that in formulating the null hypothesis, it should leverage the logic that significant evidence will allow one to reject the null hypothesis in order to avoid type one errors. For multiple samples, the appropriate test for independence is the Kruskal-Wallis Medians Test (Conover 1999). The use of this test meets the following assumptions:

- Random Samples
- Independence within each Sample
- Mutual Independence among various samples
- Measurement scale at least ordinal
- Either k population distributions are identical or some the populations tend to yield larger values than other populations

3.6.1.2 Data analysis for influence of enterprise architecture on stakeholder salience.

The second step was to address the proposition for identifying the presence of influence by enterprise architecture (Nightingale and Rhodes 2004) on the stakeholder salience attributes (Mitchell et al. 1997). The data for this investigation was initially captured in a semantic form based on the extended data from the respondents justifying their assessment of the salience attribute for the stakeholder. The data was then processed using initial coding to identify initial themes, then using focused coding to build and clarify the categories and assess degree and type (Charmaz 2006). These results were then evaluated to determine the level of influence using the same Likert scale. These data were then tested to prove the independence of the stakeholder salience sub-attributes and the enterprise architecture framework views using the Kruskal-Wallis Medians Test.

3.7 Refine Hypothesis

Building theory from case study methods is iterative as it leverages this critical step as it "forces investigators to look beyond initial impressions and see evidence thru multiple lenses," and sharpens the construct definition, validity and measurability (Eisenhardt 1989). This step also ensures that the investigator attends to all the data both in content and in richness (Yin 2009). Based on the results of the statistical tests stipulated above, and given that the previous tests allowed the more general conclusions for dependence, it follows that the investigator will perform tests on the influence relationships explicitly. Conclusions reached from these statistical extensions will further advance the contributions in the theory generating process.

3.8 Enfolding Literature

Just as the literature review is critical in identifying the initial theoretical gap(s) for the research effort, this step uses two approaches to further address the research questions and strengthen the propositions for the theoretical contribution. This is done through two approaches, comparison with conflicting literature and comparison with supporting literature. Comparison of findings with conflicting literature builds internal validity, raises theoretical level, and sharpens construct definitions. Comparison of the findings with supporting literature sharpens generalizability, improves construct definition and raises theoretical level (Eisenhardt 1989). This also enhances the quality of the analysis by addressing four principles (Yin 2009):

- Attend to all data to by ensuring that interpretations account for all data and alternative interpretations.
- Address all major rival interpretations either directly or restate as a research for future studies.
- Ensure that the analysis addresses the most significant aspect of the case study.
- Build expert knowledge in the case study effort.

Using these principles as guides, the case study methodology provides commits the investigator to return to the data to address inconsistencies or opportunities identified between the refined hypothesis and existent literature.

3.9 Closure

3.9.1 Within-Case Closure

The decision for closure within a case is based on the notion of theoretical saturation (Glaser and Strauss 1967). The literature helps to guide the analysis of the qualitative data. Based on the literature review this provides a "theoretical horizon" for the coding and analysis of the extended data. As a result, using the frameworks established in the literature, the coding strategy was well defined by the constructs and was focused on the relationships between the frameworks. After the completing initial and focused coding processes, analysis of the Likert Scales, iterations of refining the hypotheses, comparative analysis with existing literature further data analysis until the resulting propositions were as focused and strong as plausible. At this point, the case was then written up independently.

3.9.2 Cross-Case Analysis

With the data collected and analyzed within each case, a similar data analysis process was conducted for comparing and contrasting all three cases. This was facilitated by the hybrid data approach of incorporating similar quantitative data analysis techniques with multiple samples and cross-case coding for the relationships based on the frameworks used. This analysis permitted data analysis across the cases to identify general results to inform the refinement of grand hypotheses and contrasting the cases for further insights. This hybrid approach was iterative as well until theoretical saturation was reached for improving the propositions based on the whole of the data.

3.10 Communicating the Results

A critical aspect of the research process is conveying the contribution and the results of the research findings (Yin 2009). To facilitate the flow of the findings and maintain clarity, the report follows the research process at the case-level and then presents the synergies of the work at the cross case level. This allows for the replication logic to sharpen and focus the theoretical contributions and amplify policy recommendations in the context of the research. Additionally, this allows for distinction in future opportunities to continue research efforts to continue building or testing the contributions for theoretical and/or practical aspects.

3.11 References

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4 Case 1 Program A

4.1 Background

The first case focused on an Army aviation program. The program traces its requirements to 1960. The Army and Navy had solicited proposals from industry for an aircraft that could provide aerial reconnaissance mission support. Nearly 7 years later, the Army accepted the first helicopter and subsequently deployed the aircraft into Vietnam months later. In 1974, the Army approved the Aviation Helicopter Improvement Program, which called for a near term scout helicopter that had day, night and adverse weather capability, long-range observable subsystem and compatibility with advanced maneuver and attack systems being developed. The industry partner that produced the current materiel solution presented a more robust version of the current aircraft with the requested sensors integrated. In winning the competition, the relationship between the services and the lead industry partner was ensured to reach at least twenty years for this program. However, upon reaching the 389 aircraft desired for the fleet, the production runs for the aircraft ended in 1989.

With the aircraft reaching the planned horizon for its operations phase of the lifecycle, a new opportunity presented the program a chance to demonstrate its ability to provide capability to the warfighter in armed conflict. As the success of the aircraft's ability to find and observe enemy was displayed during Operations Desert Storm/Shield, the Army decided to enhance the weaponry to provide a limited attack capability. Upon the successful integration of the weapons, a new model nomenclature was awarded to the aircraft, designating its fourth generation.

4.2 Motivation

In terms of establishing an initial case for study, program A, was ideal both from a theoretical and practical vantage. It was touted as a successful program, with a rich history of consistent, well-developed relationships amongst the stakeholders. Having been in the operations and sustainment phase of the system's lifecycle for more than 40 years, with 15 years in the current configuration, the roles and relationships for this program had been codified and were well understood by the enterprise.

4.3 Review Existing Case Studies

After completing the literature review, there were no case studies that focused explicitly on Program A. There was one case study that included program A as a unit of analysis, but this case study was focused on only one part, test and evaluation, in the acquisition process (Aragon 1994). The findings of this case study research identified practices that could be implemented by several key stakeholders that would enhance the test and evaluation efforts to the defense acquisition process. While many of these recommendations are supported by thorough analysis, in the larger context of life-cycle management, the recommendations place additional requirements for consideration in the value identification process on stakeholders that are principally focused on the value delivery. As such, this case study targeted the acquisition process, and only implicitly addressed stakeholder interactions.

Based on open source documents, the principle references for this case were preliminary research efforts (Matty et al. 2008; Matty et al. 2007). This work was principally focused upon the enterprise architecture and systems analysis of logistical support at the U. S. Army Aviation Warfighting Center, Fort Rucker, Alabama. The logistical support for Fort Rucker was the primary mission of the Aviation Center Logistical Command (ACLC). Given that all of the associated units and organizations at Fort Rucker have clearly articulated mission statements, well-defined functional tasks, and regulations with explicit metric standards, this enterprise was assessed using the Lean Enterprise Self-Assessment methodology (Nightingale et al. 2001). The results found that the enterprise was very low in terms of the enterprise integration. While this conclusion was based principally on the process architecture, there were several key insights that were observed during the survey triangulation process using operational data. The primary insight is well known to systems analysis where local results are maximized, but less than optimal results are achieved globally.

An instance of this was comparison of the key performance indicators for the two salient stakeholders – the US Army Warfighting Center's 11th Aviation Brigade that was responsible for the training of the students, and the ACLC that provided logistical and maintenance support for the supporting aircraft fleet. While the aviation center is a multi-program enterprise including other programs from the program for this particular

case, i.e. Blackhawk, Chinooks etc. the findings were systemic across all programs. Both stakeholders were successful in meeting their respective mission standards with a nearly meeting the number of graduates required from the schools, codified with a 96% graduation rate for students, and a 73% operations readiness rate for the aircraft, where 70% is the objective threshold. However, when establishing the relationship between the two by determining the number of hours available and the number of hours required for training the number of students for a 12 month period, it was apparent that a nearly 43% - 65% surplus of aircraft availability existed across the programs (Matty et al. 2008). This significant indication of the persistent dynamics of the value creation process and had been observed for the most recent five years. The explanation for this excess capacity was identified in the value creation process with the apparent disconnected value identified, the hierarchy of functional value proposition process and resulted in the surplus value delivery. Based on the existing enterprise architecture, the organizational and process views deterred the knowledge view ability to facilitate this integration. This also suggested that the enterprise architecture influence the stakeholders and their efforts in the value creation process.

4.4 Develop Initial Hypotheses

Chapter 3 develops the logic for the initial hypothesis that served as the basis for each of the cases. The initial hypotheses also served as the basis for the iterative steps of analyzing data, refining hypothesis and enfolding in the literature.

> **P1:** The stakeholder salience attributes influence the enterprise program value creation process.
>
> **P2:** The program enterprise architecture influence stakeholder salience attributes.

4.5 Crafting Protocols

The reference case work indicated that protocols developed for quantifying stakeholder salience, the stakeholder salience index (Grossi 2003), would be useful in the collection of necessary data to understand the relationships between enterprise architecture stakeholder salience and value creation. The protocols prescribed in Chapter 3 were applied. One of the major themes of research in stakeholder theory is the identification and classification of stakeholders (Friedman and Miles 2006; Laplume et

al. 2008). The existing framework allows for the classification of these entities as non-stakeholders and stakeholders based on the perceived presence of the salience attributes (Mitchell et al. 1997). While an initial list of stakeholders was developed as part of the preliminary coordination and research, without formally applying the salience framework the entities or individuals on this list are referred to as candidate stakeholders; however it is not a specific focus of this effort to classify the entities but to understand the relationships between their perceived attributes and these attributes influence on value creation.

4.6 Collect Data

In accordance with the protocols established, an initial set of eighteen candidate stakeholders was established. The term candidate is used as recognition to the substantial literature devoted to the identification and categorization of stakeholders (Friedman and Miles 2006; Laplume et al. 2008). One of the principle contributions of the Stakeholder Salience framework is the identification and categorization of stakeholders as well as non-stakeholders (Mitchell et al. 1997). Based on preliminary inquiry with the candidate stakeholders, this list was expanded to a list of twenty-three candidate stakeholders.

The Stakeholder Salience Index assessments (Grossi 2003) were provided to the stakeholder respondents electronically, and initial interviews were scheduled. Using the lattice sampling approach, the sampling plan was developed. The following figure illustrates the sampling approach where the candidate stakeholder was asked to complete a self-assessment and four other candidate stakeholder assessments.

The settings for administering the survey-interviews varied with sixteen recorded telephonic interviews referencing the provided copy of the Stakeholder Salience Index assessment or seven with WebEx®, which is an internet-based application that allows one to share the image on one's computer screen with distant parties and simultaneously record the voice communication. The Webex was preferable, as the respondent was not required to manipulate the assessment sheets or provide the completed response sheet after the interview; however, many respondents were restricted from participating on Webex due to information security measures.

The responses consisted of selecting a description of the assessed candidate stakeholder with respect to a specific salience attribute. As an example, the attribute and

the descriptions are provided below; the complete Stakeholder Salience Index assessment is enclosed in Appendix A.

Table 4-1. Stakeholder Salience Attribute Description

Criticality:
 	
    • The stakeholder is time insensitive or has very low demands for a timely response to its claims at risk in the enterprise
    • The stakeholder asks for its stakes or values with enough anticipation allowing the enterprise to attend them in a timely manner
    • The stakeholder requires attention to its stakes in plausible or reasonable times
    • The stakeholder calls for a prompt attention to the stakes at risk in the enterprise
    • The stakeholder demands immediate attention to the stakes it compromise in the enterprise and their associated payoffs

Upon selecting the most representative description, in this case for criticality which is a component of salience attribute of Urgency, the respondent would extend the data when prompted with the such questions as "why does the this entity demand immediate attention?" or "Why doesn't this entity need more attention from others in the enterprise?" This allowed for justification of the assessment; however, this justification was then coded against the enterprise architecture framework views.

The initial interview was focused on reviewing the terminology of the Stakeholder Salience attributes, conducting the self-assessment using the stakeholder salience index assessment with extending the data. The final portion of the interview was to review the other stakeholder candidates that were to be assessed in the second interview. Initially, several respondents were hesitant to assess some of the others, as they did not work directly with them. After the sampling approach was explained using multiple perspectives and the assurance of anonymity, there were no refusals.

Prior to the second interview, the respondents had completed making their selections of the appropriate descriptions for the remaining four candidates stakeholders. This was to allow for more thorough discussion and extending the data. All of the second interviews were conducted with the same individual that participated in the initial interview. Based on the previous self-assessment interview, many had comments prepared for their justifications. During this second interview, the respondents were also

introduced to the value creations process framework and asked to assess the influence of the stakeholder salience attributes that were now very familiar upon the value creation process steps. These nine relationships were assessed using a Likert scale as described in Chapter 3. These scores were then recorded on a response sheet by the interviewer. Upon conclusion of the interview, the respondents were able to review their responses real-time using the Webex or were provided a copy of their responses in raw form. Upon acceptance and validation by the respondent, the data was then processed and analyzed.

4.7 Analyze Data

4.7.1 Proposition 1: The Stakeholder Salience Attributes Influence The Enterprise Program Value Creation Process.

The data that was recorded from the interviews was both quantitative from the use of the Likert scale and qualitative from the justifications. The following presents the data analysis supporting consideration of proposition one: The stakeholder salience attributes influence the enterprise program value creation process.

The Likert scale used was an extension of the five point Likert Scale (Siegle 2008). This extension to a 10-point scale was done to avoid confusion about scoring during the interview as the Stakeholder Salience Index assessment was based on a 10-point scale. In accordance with the study protocol, the data was then placed into a database for statistical analysis. Without the existence of previous literature to provide insight on the expected distribution from this non-parametric analysis techniques were used. In order to identify the relationships of the salience attribute and the value creation process the following pairing were developed:

Table 4-2. Pairing of Salience Attribute to Value Creation		
Pairing	**Attribute**	**Value Creation**
11	Power	Identification
12	Power	Proposition
13	Power	Delivery
21	Legitimacy	Identification
22	Legitimacy	Proposition
23	Legitimacy	Delivery
31	Criticality	Identification
32	Criticality	Proposition

33	Criticality	Delivery

Nonparametric techniques do not make typical assumptions of the distributions such as symmetry, modality, etc. These methods seek to draw insight from the observations, rather inference from the parameters that typically are used to define the distribution family. Most nonparametric techniques also use the median as the primary statistic for the measure of central tendency. The following graph illustrates the medians, depicted on the Y-axis, for the nine influence relationships, depicted on the X-axis.

Figure 4-1. Graph of Medians for Salience Attribute Influence on Value Creation

From the graph, it is evident that pairings 12, 21, and 33 have very high medians and 22 is very low. In structuring the test hypothesis, the objective is to structure the test so that the presence of strong evidence will allow the researcher to reject the null hypothesis. The null hypothesis when comparing these pairing constitutes a multiple sample test. A multiple sample test that compares the medians from the samples is the Kruskal-Wallis test. The null hypothesis proposes that all medians are equal, while the alternative hypothesis is that at least two of the medians are different. As is common with hypothesis testing a p-value is computed and then compared against a pre-determined level of significance. The consistent level of significance stated in Chapter 3

was 0.05. Upon inspection of the graph, it was not surprising that the p-value for this test was 0.00.

Table 4-3. Kruskal-Wallis Analysis

Kruskal-Wallis Nonparametric ANOVA: Score	
H_0: Median 1 = Median 2 = ... = Median k	
H_a: At least one pair Median i ≠ Median j	
Kruskal-Wallis Statistic (H)	164.48
DF	8
P-value (2-sided, adjusted for ties)	0.0000

We reject the null hypothesis that all medians are equal and conclude that the influence relationships are different. This was an important test due to the possibility that the influence of all salience attributes on all value creation processes could have been rated as very important. Had this data been observed then essentially, this would indicate that that none of the influence relationships was important. Based on the strong evidence, the initial hypothesis of stakeholder salience attributes influence the enterprise program value creation process can be refined.

4.7.2 Proposition 2: The Program Enterprise Architecture Influence Stakeholder Salience Attributes.

The data linked to the second proposition was qualitative. As described in the methods section, the data was collected during a series of interviews where respondents assessed selected candidate stakeholders' salience attributes using the salience attribute index assessment (Grossi 2003). During the completion of this assessment, the respondents provided extended data that was analyzed qualitatively to determine the level of influence of the enterprise architecture views (Nightingale and Rhodes 2004; Rhodes et al. 2009) on the stakeholder salience attributes (Agle et al. 1999; Mitchell et al. 1997). It is important to note that influence of enterprise architecture on the assessment of the stakeholder salience does not necessarily infer that that high influence resulted in high salience assessments. In fact, the majority of the extended data analysis indicated that the salience attribute was not high due to limitations of the candidate stakeholder due to enterprise architecture.

A common example of this was the influence of Process and Organization. As an example, a candidate stakeholder that had explicit responsibility for a key task, which should lead to high legitimacy by definition, was not assess as having high legitimacy. The further investigation revealed another candidate stakeholder, which was assessed as having high power, had created a redundant process to complete the task. As a result, other assessments perceived that the first candidate stakeholder had low legitimacy, while the second candidate stakeholder was assessed as high legitimacy due to the influence of the process architecture that was being implemented. This also provides insights relative to the dynamic and cumulative nature of the enterprise – while the documented enterprise architecture may imply stakeholder salience, the value creation process can change over time based on the influence of stakeholder salience. This dynamic cycle is evidence of the framework of the dynamic stakeholder salience enterprise engineering system.

The results of the qualitative coding produced a frequency and intensity of influence that was codified using a Likert scale. The scale is presented in the following table:

Table 4-4. Likert Scale for Influence

Unimportant	1
	2
Of Little Importance	3
	4
Moderately Important	5
	6
Important	7
	8
Very Important	9
	10

The results of this qualitative data process were captured in a database, and then analyzed using ordinal data analysis. Before conducting the statistical testing, it is helpful to review the data for the influence of the enterprise architecture views influence on stakeholder salience (EA-SS). The median score are presented in the following table:

Table 4-5. Median Influence EA-SS Scores

	Urgency		Power			Legitimacy		
	Criticality	Importance	Coercive	Utilitarian	Symbolic	Pragmatic	Moral	Cognitive
Policy/EF	1	3	9	4	4	8	3	2
Strategy	1	2	3	4	2	3	2	2
Process	9	9	7	8	6	9	2	8
Organization	8	8	9	6	9	5	8	5
Knowledge	5	5	7	5	2	9	2	7
Infra/Info-Structure	5	5	5	8	8	5	8	5
Product	8	4	8	8	8	6	5	5
Service	7	5	5	8	5	5	5	5

While it possible to explicitly test for differences across the influence relationships using an extension of the Median Test (Conover 1999), a more standard and efficient statistical analysis method is analysis of variance (ANOVA) (Devore 1999). The non-parametric test for ANOVA is the Kruskal-Wallis test. This test's null hypothesis is that the sample scores should have the same results, while the alternative is that at least one has larger scores. From the table it was anticipated the samples for each of the influence relationships would be different. The result of this test produced a p-value of 0.000. Therefore, the decision is to reject the null hypothesis and conclude that at least one of the influence relationships is higher than the others. This result leads the researcher to explore those enterprise architecture views that either strongly or weakly influence the stakeholder salience.

4.8 Refine Hypothesis

4.8.1 Stakeholder Salience Influence on Value Creation

While Figure 4.1 has already highlighted several influence relationship that we would expect to be important or very important, 13 and 31 appear to have scores that that may be possible. Using the non-parametric sign test, the null hypothesis is that the

median is equal to six and the alternative hypothesis is that the median is greater than six. This test method was selected, as it was evident that the observations were not symmetric about the median, which is an underlying assumption for the alternative test method, Wilcoxon Rank-Sum Test. This hypothesis allowed for strong evidence to rejecting the null hypothesis, which leads to the conclusion that the influence relationship is important or very important based on the Likert scale. The results of the statistical analysis for all influence relationships are presented in the following figure.

1 Sample Sign Test for Medians: Score									
H₀: Median = 6									
Hₐ: Median Greater Than 6									
Interaction - Code	11	12	13	21	22	23	31	32	33
Count (N)	23	23	23	23	23	23	23	23	23
Median	5	9	6	9	2	4	6	4	8
Points Below 6	16	0	8	0	23	16	5	19	0
Points Equal To 6	7	0	5	0	0	7	11	4	0
Points Above 6	0	23	10	23	0	0	7	0	23
P-value (1-sided)	1.0000	0.0000	0.4073	0.0000	1.0000	1.0000	0.3872	1.0000	0.0000

Figure 4-2. Sign Test Results for All Pairings Influence Relationships

The results of this analysis permit the following conclusions:

The influence of	Power	on	Identification	**is not** important or very important.
The influence of	Power	on	Proposition	**is** important or very important.
The influence of	Power	on	Delivery	**is not** important or very important.
The influence of	Legitimacy	on	Identification	**is** important or very important.
The influence of	Legitimacy	on	Proposition	**is not** important or very important.
The influence of	Legitimacy	on	Delivery	**is not** important or very important.
The influence of	Urgency	on	Identification	**is not** important or very important.
The influence of	Urgency	on	Proposition	**is not** important or very important.
The influence of	Urgency	on	Delivery	**is** important or very important.

Based on these conclusions, the following propositions are provided as a result of this

P1a: Stakeholder Legitimacy strongly influences Enterprise Value Identification

P1b: Stakeholder Power strongly influences Enterprise Value Proposition

P1c: Stakeholder Urgency strongly influences Enterprise Value Delivery

These conclusions provide new insight for the relationships between the stakeholder salience model and the value creation process framework. These insights now permit one to understand that based on the perception of the presence of the salience attributes how the stakeholders influence the value creation process of the enterprise. For the candidate stakeholders, this was very enlightening but also well accepted. Numerous respondents expressed 'frustration' that while their legitimacy allowed them to offer value opportunities to the enterprise, the decision making processes in the value proposition phase were dominated by those stakeholders that had high-levels of power to drive the process. As a result, the stakeholders that had high-levels of urgency forced the enterprise into a reactionary mode and focused on those stakeholders at the expense of the overall value opportunities. It was apparent that the second proposition was critical to help identify policy opportunities to redesign the enterprise architectures to address this challenge.

4.8.2 Enterprise Architecture Views Influence on Stakeholder Salience.

From the medians for the sixty-four influence relationships, there were several influence relationships that appeared important or very important, while others appear to be unimportant or of little importance. To test for these conclusions, we examine the scaled qualitative data. The non-parametric Sign test was selected. Given the ordinal values for the Likert scale selected, for an enterprise architecture view to be considered an important or very important influence on stakeholder salience, there must be strong evidence to suggest that the median is greater than six. Likewise, for an enterprise architecture view to be unimportant or of little importance to influence stakeholder salience, then their must be strong evidence to suggest that the median is less than five. The sign test was applied to all the enterprise architecture views with the scaled observations as the ordinal data.

While there were twenty-three respondents, due to the categorization that occurs in looking at the influence relationships, the observations increase dramatically at a rate of sixty-four observations per respondent per assessment or 7360 total observations. This had an impact on the sensitivity of the testing procedure. In the case of identifying important or very important influence relationships, the test statistic, which is the count

of observations that are greater than the expected median value of six, can be approximated by a normal distribution. Therefore, as the number of observations increases the standard error for a given level of significance will decrease at a rate of the square root of the number of observations. As a result, the critical value for rejecting the null hypothesis is very close to the expected count, which for the Sign test uses the worst case of fifty per cent success. The test is very useful still as this sensitivity is accounted for in the logic of the selection of the hypothesized median and the ordinal scale. The results of the calculations for the two sets of hypothesis are presented in the following tables.

Table 4-6. Sign Test for Important EA-SS Influence

1 Sample Sign Test for Medians: OBS								
H_0: Median = 6								
H_a: Median Greater Than 6								
EAV	Infra/Info-Structure	Knowledge	Organization	Policy/EF	Process	Product	Service	Strategy
Count (N)	920	920	920	920	920	920	920	920
Median	6	5	8	4	8	7	5	2
Points Below 6	372	488	185	644	164	307	463	884
Points Equal To 6	152	117	114	48	93	110	161	22
Points Above 6	396	315	621	228	663	503	296	14
P-value (1-sided)	0.2033	1.0000	0.0000	1.0000	0.0000	0.0000	1.0000	1.0000

From the results of the statistical analysis, the conclusion is that Organization, Process, and Product are important or very important to influence stakeholder salience.

Also, while infra/info structure was scored as moderately important with a median score of six, it had third highest number of observations above six, but had a significant number below six that produced a p-value of 0.2033. This bi-modal response was indicative of the different stakeholders and the interaction between process and organization infra/info-structure (Nightingale and Rhodes 2004). there was a explicit relationship in the responses of the stakeholders that described themselves in their self assessment as principally life-cycle process focused (Nightingale 2002).

The second pair of null/alternative hypotheses are tested and presented in the following table.

Table 4-7. Sign Test for Unimportant EA-SS Influence

1 Sample Sign Test for Medians: OBS							
H₀: Median = 5							
Hₐ: Median Less Than 5							
EAV	Infra/Info-Structure	Knowledge	Organization	Policy/EF	Process	Product	Service	Strategy
Count (N)	920	920	920	920	920	920	920	920
Median	6	5	8	4	8	7	5	2
Points Below 5	228	389	112	551	132	197	267	812
Points Equal To 5	144	99	73	93	32	110	196	72
Points Above 5	548	432	735	276	756	613	457	36
P-value (1-sided)	1.0000	0.9377	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000

The results allow the conclusion to be drawn that in the current enterprise architecture, strategy and policy/external factors are not important in influencing stakeholder salience. These results were somewhat surprising given the intense efforts of senior leadership to provide very explicit and detailed policy to govern DOD acquisition enterprises. One senior official offered the following insight, "We document stylized processes in policy, but we execute real ones." This sentiment was echoed amongst nearly all the candidate stakeholders, where policy is a guideline not a hard and fast rule. The Army uses two terms: requirements and constraints. Requirements are those tasks that are must be conducted and constraints are those actions that are prohibited. Review of the extended data showed the following to be prevalent. Policy is primarily the means for higher levels of organization to mandate increasing requirements upon those entities at lower levels of the process hierarchy to improve outcome quality and integration. As a result, policy masked by processes that may not be explicitly executed with the policy's nuances enacted. This masking of hierarchy intent occurred with the regard to strategy as well. While the capability that was provided by the program enterprise was well know across all candidate stakeholders, only three of the stakeholders attempted to provide responses into the next level of integration of how the program supported the multi-program level enterprise. In fact, their perspective was one of resource competition and defense of their resources and authorities.

The next refinement was to test the orthogonal perspective: What stakeholder salience attributes were most influenced by enterprise architecture? The existing enterprise architecture was important to influence two of the three sub-attributes for power, Coercive and Utilitarian, with Moral, a sub-attribute of Legitimacy being, un-

influenced by the different enterprise architecture views. We will address this power aspect in context of the existing literature, but the moral influence was not surprising given the common perception that the Army is a values-based organization. As a result, those organizational values were deemed to be institutionalized rather than as a result of enterprise design.

P2a-c: Process, Organization, Product have important or very important influence on Stakeholder Salience attributes.

P2d: Strategy and Policy/External Factors have low influence on Stakeholder Salience attributes.

P2e: Coercive and Utilitarian (Power) is most influenced by the current Enterprise Architecture

P2f: Moral Legitimacy is least influenced by the current Enterprise Architecture.

4.9 Enfolding Literature

The previous section presented the explicit findings based on the data analysis. In the section, the following provides the context of where these findings can be placed in the literature to facilitate addressing gaps or strengthening existing theory. This is a multi-discipline effort that draws from the domains presented in Chapter 2 to reconcile complementary and competing perspectives that are inherent in enterprise engineering systems.

4.9.1 Stakeholder Salience Influence on Value Creation

P1a: Stakeholder Legitimacy strongly influences Enterprise Value Identification

As presented in Chapter 2, the process of value identification is the extension of the definition phase of the system engineering methodology (Sage and Armstrong 1999). One of the most controversial aspects of stakeholder theory centers around the debate of the broad or narrow view (Freeman 2004; Jensen 2002) that defines what candidate stakeholders have a legitimate claim on the enterprise (Mitchell et al. 1997). The first finding from this case study is that for those stakeholders that demonstrate legitimacy, they influence the enterprise value identification. As the first step in the value creation process, the unilateral or bilateral exchanges amongst the stakeholders are put forth. Those that subscribe to a view that the interorganizational relationships are only those

explicit interactions, captured by transaction cost economics (Williamson 1994) or resource dependency (Clarkson 1995), will limit this step to looking at the requests for proposals and corresponding proposals; however, stakeholder theory with a normative perspective (Donaldson and Preston 1995) allows for a broader view considering "non-trivial relationships" including moral responsibilities just as the exchange transactions (Brenner 1993).

By the definitions provided for legitimacy (Mitchell et al. 1997), it may be possible, albeit difficult, for an enterprise to generate the necessary value for the end-user by performing an incomplete value identification, the program enterprise cannot sustain itself without accounting for the stakeholders' claims (Murman et al. 2002). This is especially true in the bureaucratic program enterprise where the problem of accountability (Wilson 1989) while directly linked to the enterprise's ability to complete value identification, also strives to achieve efficiency which increasing in complexity when there are divergent legitimate claims.

P1b: Stakeholder Power strongly influences Enterprise Value Proposition

The value proposition process at the program level formalizes the program objectives, defines the relationships between and structure the program to deliver expected value to the stakeholders." (Murman et al. 2002) While this process is congruent to the system develop phase, the main difference is that the value proposition expands the engineering effort to include the technical engineering processes as well as the institutional aspects of the stakeholders value exchanges.

In the development of the Stakeholder Salience Framework, several definitions of Power are presented (Mitchell et al. 1997). Based on the responses in the extended data, the following was the one most commonly applied by the respondents: "the ability …to bring about the outcomes they desire."(Salancik and Pfeffer 1974) The sub-attributes used by the Stakeholder Salience Index assessment (Grossi 2003) are explicitly defined in the framework's development (Etzioni 1964; Mitchell et al. 1997). This ability to bring about the outcomes in a bureaucracy is how the organization addresses its accountability challenge (Wilson 1989). While the enterprise may have been very thorough with its value identification processes, the system complexity, that is typical of an enterprise engineering system, the uncertainty and risk from in the environment (Cutcher-

Gershenfeld and Rebentisch 2002), alter the dynamic state of the system (ESD 2002).
While the well-being of the enterprise is dependent on the sustainment of the necessary
value exchanges, the pressures to meet accountability requirements (Wilson 1989) placed
on the powerful stakeholder often cause them to justifies responsiveness and focus the
enterprise proposition to align closer to their value needs. This confirms the data
captured about powerful stakeholders dominating the decision-making processes.

P1c: Stakeholder Urgency strongly influences Enterprise Value Delivery

One of the prominent characteristics in enterprise operations management is the idea
of Just-in-Time operations (Murman et al. 2002; Sheffi 2005; Womack and Jones 2003).
This idea captures the essence of urgency from a stakeholder salience attribute. The
definition provided in the Stakeholder Salience Framework is based on "the degree to
which a stakeholder's claim calls for immediate action." (Mitchell et al. 1997) This
attribute adds a dynamic component to the framework as it explicitly gauges temporally
the interactions. As stated in the motivation for this research, there is an average of 23
months delay in fielding capability for Defense acquisition systems indicating the
severity of this attribute for end users (GAO 2009) and frequency is related in other
research with a significant number of programs that experience delays (Cutcher-
Gershenfeld and Rebentisch 2002). To place this in context, an Army unit operates on a
three-year cycle – two years training, one year deployed. This delay would cause a unit
to be handed new equipment just before heading into a combat zone.

With this basis for the role that urgency has in value delivery, in the context of the
bureaucratic program enterprise, this attribute presents a dilemma. The two primary
challenges are equality and responsiveness (Wilson 1989). In the characteristics of
bureaucracy, the rules, once decided are well established, directly supporting the notion
of equality. However, the stakeholders that have a high degree of urgency require a
relatively high level of value exchanges. Given the ongoing operations experience by
this program enterprise in supporting the Army in two theaters the literature strongly
confirms this finding.

4.9.2 Enterprise Architecture Views Influence on Stakeholder Salience.

Unlike many commercial ventures that may be new start-ups or "skunk works," this research acknowledges that the government and defense industry have national-level enterprise architectures in existence. Based on the existence of these enterprises, we examine how the Enterprise Architecture developed for a particular program enterprise influences the stakeholder salience.

P2a-c: Process, Organization, Product have strongest influence on Stakeholder Salience attributes.

The process view is comprised of the activities by which the enterprise generates value for the stakeholders (Rhodes et al. 2009). This process view is comprised of a process architecture that addresses three levels of processes: lifecycle, enabling infrastructure and enterprise leadership (Murman et al. 2002; Nightingale 2002). This architecture is the basis of what is developed as "task environment" (Thompson 1967).

The organizational view includes organizational structure as well as relationships, culture, behaviors, and boundaries between entities (e.g. individuals, teams and organizations) (Rhodes et al. 2009). In their seminal work (Lawrence and Lorsch 1967), organizations necessarily create boundaries to allow specificity and expertise. This is a key characteristic in the bureaucracy (Weber 1946). However, as a result of this decomposition the role of integrators needed. A relationship was identified between the amount of differentiation and integration such that the more differentiation the greater the need for integrators (Lawrence and Lorsch 1967). Additionally the integrators must be positioned in the hierarchy to ensure that integration is enforced to resolve any conflicts (Lawrence and Lorsch 1967). While these principles are fundamental in the characteristics of bureaucracy, it follows that by the granting of these integration responsibilities with the ability to enforce integration, an integrator has been allocated power and legitimacy. The notion of urgency is also implicit based upon the severity and frequency of conflicts.

A product is thought of as the instantiation, physical or virtual, of value that is delivered to the stakeholder. The product view consists of the products produced by the enterprise for use by its stakeholders. This product architecture view may be very

elaborate when a product architecture consisting of technical views at the system, sub-system and component levels and higher at a family level to account for variants (Thevenot and Simpson 2009). Given the well established decomposition for functional responsibilities in the military (Hadley 1986; Wilson 1989), decomposing a product nearly provides an organization chart for the stakeholders that would expectantly manage, contract, support, finance, and ultimately use the system to be developed.

P2d: Strategy has Low influence on Stakeholder Salience attributes.

The stated definition of the Strategy view is "goals, vision and direction of the enterprise, including business model and competitive environment" (Rhodes et al. 2009). Based on the Process Architecture leveraged in the Enterprise Architecture views (Nightingale 2002), the strategy view is mostly perceived at the enterprise leadership processes. This is significant as it is at the program enterprise level that industry partners or candidate stakeholders have the highest level of legitimacy. The strategy view is the perspective that goals and supporting objectives are identified. These objectives are the basis of what guides the enterprise to work toward a shared vision. While all stakeholders in a DOD program enterprise are supporting to provide capability to the end user, this may not be the primary objective. The literature refers to this dichotomy as the Agent-Steward Dilemma (Martynov 2009) While this is typically an ethical consideration for individuals, it can be considered for the entities of individuals or organizations - stakeholders (Eisenhardt 1989). The principal behavior is described as when desires or goals of the principal and the agent conflict, and it is difficult for the principal to check the agent's actions (Eisenhardt 1989). The stewardship behavior is when the stakeholder chooses to serve the principal's objectives rather than pursue opportunities that would not result in a common benefit (Martynov 2009). While this behavior is a component of the culture of the organization, the use of power can predispose stakeholders to agent-principal relationships (Davis et al. 1997). This is finding illuminates the self-defeating attempts to leverage contracting types to assert greater power by the government over industry partners not only by shifting risk but also with elaborate management information systems to capture value delivery in increasingly smaller reporting cycles (Sapolsky et al. 2009). While, this research does not propose a

solution to this dilemma, the explicit identification of effects of this phenomenon has not been presented in literature.

P2e: Moral Legitimacy is least influenced by Enterprise Architecture views.

Moral legitimacy predominantly captures the normative perspective of stakeholder theory. While other sub-attributes capture "goodness" of a candidate stakeholder by their contributions to achieved the desired results of the enterprise, moral legitimacy assesses the ethical support of the enterprise. While the literature does not provide recent explicit studies on the moral legitimacy of Army or defense industry organizations, the literature that considers moral claims does not connect aspects of enterprise architecture strongly other than organizational responsibilities (Brenner 1993).

4.9.3 Enterprise Architecture View Interaction

An additional comment based on the literature is that the enterprise architecture views are not independent; the framework provides interactions among the views (Nightingale and Rhodes 2004; Rhodes et al. 2009) However, in establishing this initial data set for analysis, statistical testing methods used test the enterprise architecture views and the respective stakeholder salience sub-attributes without the interaction terms. The interactions of the enterprise architecture views are identified as part of the future research refinements.

4.10 Closure

Based on the statistical analysis supporting the refined propositions, the evidence of supporting literature and addressing conflicting perspectives, the findings of this case will be forwarded for reevaluation in the cross-case analysis.

Several steps have been taken to address validity. The first was the data collection effort with multiple sources of data, verification of the transcripts and assessments by the key informants, a clear chain of evidence and use of a case study database as part of a rigorous case study protocol. The second was the approach for data analysis to ensure that all data was addresses and focused on both rival explanations but remain focused on the most significant aspects of the case. All these combined with the replication logic for the remaining two cases strengthen the validity of the case study and its findings.

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5 Case 2 COTS Program

5.1 Background

The second case focuses on an Army aviation program that was intended to provide critical capabilities for the Army's aerial reconnaissance efforts. The combatant commanders requested the capabilities for their efforts in Iraq and Afghanistan. The initiation of the program was announced in 2004, shortly following the Army's cancellation of the world's most advance aerial reconnaissance helicopter, the Comanche. The Comanche, a 23-year effort, had a history of challenges with six program restructurings. A program is restructured when significant changes to schedule, quantities, or specifications occur. In the case of this program, budget pressures as well as schedule challenges were the primary drivers for the program restructurings and ultimately the cancellation. This final decision was not a surprise as several independent reviews had identified the persistent as well as new challenges (GAO 2001).

Given this pattern of program challenges, the Army proactively developed a plan to reallocation of the planned fiscal resources to directly affect its capabilities. By reallocating the resources to significantly improve the readiness of other platforms addressing deferred maintenance and supply-chain backlogs, the Army could extend the lifetime of existing air frames to allow for an accelerated "commercial off-the-shelf" (COTS) acquisition. Using benefits of this approach (Templin and Heberling 1994), this new program would leverage technologies that were determined to be mature, and as part of the source selection, team with industry partners with a record of successful aviation development programs. The Army leaders perceived that this approach would mitigate risks common to technologically intense acquisition programs, and they successfully convinced the leaders at the Department of Defense to support this effort. It is important to note the background of the four key leaders in the Executive Office of the Headquarters, which consists of the top two civilian leaders and the top two generals in the Department of the Army. While the top generals typically have infantry or armor command experience, the Vice-Chief of Staff of the Army was an Army helicopter pilot, giving the leadership first-hand functional and technical experience of the required capabilities to be provided by this new program enterprise.

Additionally, while the majority of the development effort of the Comanche was during waning years of the Cold War, combatant commanders, engaged in the two theaters, were increasingly reliant on the existing aerial reconnaissance capability the Army possessed. Based on the risk mitigation and the demand to support the deployed units, a very aggressive schedule for the new program was approved with first unit equipped in four years.

According to the monthly periodic reports, the program seemed to be headed toward success. However, as the enterprise worked to complete the engineering and manufacturing development for the planned Milestone C decision, the program office reported that the program's development cost and cost per unit had increased significantly and several critical tests were postponed due to system integration problems. In March, 2007, as awareness of these challenges were acknowledged, the Army leaders issued the industry partners a "stop-work order" until plans could be revised to assure meeting the agreed to value propositions. Unable to sufficiently mitigate these risks, the Department of Defense, Undersecretary for Acquisition, Logistic and Technology, cancelled the program in October 2008.

5.2 Motivation

This case was selected primarily due to the replication of the enterprise architecture and value creation processes as a set of the three program enterprises. However, it is unique in that it is the only one of the three cases that has been canceled for failing to deliver upon its value proposition. This helps to build the internal validity of the construction of theoretical contributions using cases that were both successful and failing.

5.3 Review Existing Case Studies

A literature review failed to produce any case studies for the program that were released to the public. However, several information briefings and monthly program assessments were provided to the researcher for consideration and analysis. A summary of the monthly reports, provided by the Army, for the Probability of Success Report Tool (Higbee 2006; Higbee and Ordonio 2005) were aggregated to produce the following longitudinal analysis for the program.

From the following figure, the two areas represent the assessment of the program enterprise ability to be successful based on the assessed areas during the period January

2006, to March 2007 when a stop-work order was issued by the U.S. Army to the lead developer due to anticipated cost over-runs and schedule delays. It is interesting to note that while the technical aspects, such as program resources, program execution dramatically decreased, 26.5 percent from the maximum score of 68 in April 2006, to the minimum of 52 in March 2007, the assessed value of program advocacy, the second region on 'bottom' of the chart, remained constant.
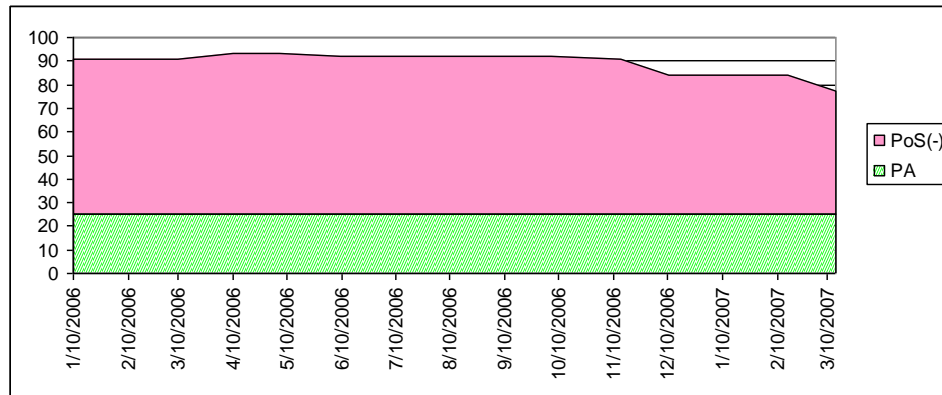
Figure 5-1 Probability of Success, Program 2

The program advocacy conveys explicit support or lack-of-support by pre-determined stakeholders – Congress, DOD leadership, Warfighters, Joint Staff, Industry, international partners, and Army leadership. This assessment is based on actions, decisions, communications, and other direct interactions between the program manager and these entities. With this information, initial analysis would indicate that weak dynamics due to stakeholder salience were influencing the value creation in the program enterprise.

5.4 Develop Initial Hypotheses

Again, the case looks at the initial set of hypotheses that serve as the basis for each of the cases:

>   **P1:** The stakeholder salience attributes influence the enterprise program value creation process.
>   **P2:** The program enterprise architecture influence stakeholder salience attributes.

These propositions will be tested and based on the data analysis and the existing literature the propositions will be refined and focused.

5.5 Crafting Protocols

The protocols used were consistent across all three cases. However, the list of candidate stakeholders was significantly different for case 2. This program enterprise was unique compared to the other cases in that the program had been canceled in 2008. As a result, all potential respondents left the organizations either through reassignment, retirement, or were no longer working for the candidate stakeholder entity. This required the researcher investigation to not only identify qualified respondents but also research a means of contact to initiate the interview process. The criterion for a respondent was that he had been in a leadership or management position for the candidate stakeholder entity for a minimum of twelve months. This ensured that the potential respondent would have been represented the candidate stakeholder entity in all processes through out an annual cycle, which is predominant business cycle for government agencies and supporting organizations. The initial list of fifteen candidate stakeholders was identified based on preliminary inquiries with the previous assistant program manager and key leaders that were still in positions of authority. From this list of fifteen candidate stakeholders, the researcher was able to interview twelve respondents that met the qualification criteria. While this is considered a small sample size, the number of observations provided appropriate amount of data.

After reviewing the case study protocol, it was determined that the current instruments would continue in use to collect the data. Using the WebEx® tool for presenting the Stakeholder Salience Index (Grossi 2003) to capture candidate stakeholder assessments and extend the data (Weiss 1994) to collect information about the initial research propositions. The Program Probability of Success reports were very helpful to inform the discussion about the candidate stakeholders in terms of value creation with regard to stakeholder salience.

5.6 Collect Data

The twelve respondents from Industry, DOD and across the Army voluntarily participated in the study. All respondents were the principles for their respective organizational entity with the exception of one Army senior leader that had retired and was not available. His executive officer was interviewed as a proxy; he was acknowledged by reputation as having full knowledge of the principal's interactions and

rationale in their engagements with the program enterprise. Due to the relevance of the previous and possible future actions as a result of the program, all respondents insisted on non-attribution and anonymity.

Due to the smaller number of candidate stakeholders, using the lattice sampling method (Abbey 1978) would have allowed for reducing the number of assessments for each respondent; however, the savings in time or effort for the responses were negligible, therefore each respondent was asked for a self-assessment and to assess four other stakeholders.

In accordance with the research protocol, the interviews were conducted in three parts – introduction and self-assessment, completion of the Stakeholder Salience Index for the four other candidate stakeholders, and the interview for justification of the stakeholder salience assessments and the value creation influence. Each part was reported to average approximately one hour. The collection effort from identifying the list of respondents until completing the last interview required nearly eight months. This was primarily due to difficulty in scheduling the interviews with the respondents.

The interviews were recorded with consent, and transcribed. These transcripts were then verified by the respondent for accuracy and completeness. The data was then processed and incorporated into the case study database.

5.7 Analyze Data

5.7.1 Proposition 1: The Stakeholder Salience Attributes Influence the Enterprise Program Value Creation Process.

The data that was recorded from the interviews was both quantitative from the use of the Likert scale and qualitative from the justifications. The following presents the data-analysis-supporting consideration of proposition one: The stakeholder salience attributes influence the enterprise program value creation process.

The scale used was an extension of the five point Likert Scale. This was done to avoid confusion as the Stakeholder Salience Index assessment was based on a 10-point scale. In accordance with the study protocol, the data was then placed into a database for statistical analysis. Without the existence of previous literature to provide insight on the expected distribution from this non-parametric analysis techniques were used. In order to

identify the relationships of the salience attribute and the value creation process the following pairing were developed:

Table 5-1. Pairing of Salience Attribute to Value Creation		
Pairing	**Attribute**	**Value Creation**
11	Power	Identification
12	Power	Proposition
13	Power	Delivery
21	Legitimacy	Identification
22	Legitimacy	Proposition
23	Legitimacy	Delivery
31	Urgency	Identification
32	Urgency	Proposition
33	Urgency	Delivery

Nonparametric techniques do not make typical assumptions of the distributions such as symmetry, modality, etc. These methods seek to draw insight from the observations, rather inference from the parameters that typically are used to define the distribution family. Most nonparametric techniques also use the median as the primary statistic for the measure of central tendency. The following graph illustrates the medians, depicted on the Y-axis, for the nine influence relationships, depicted on the X-axis.
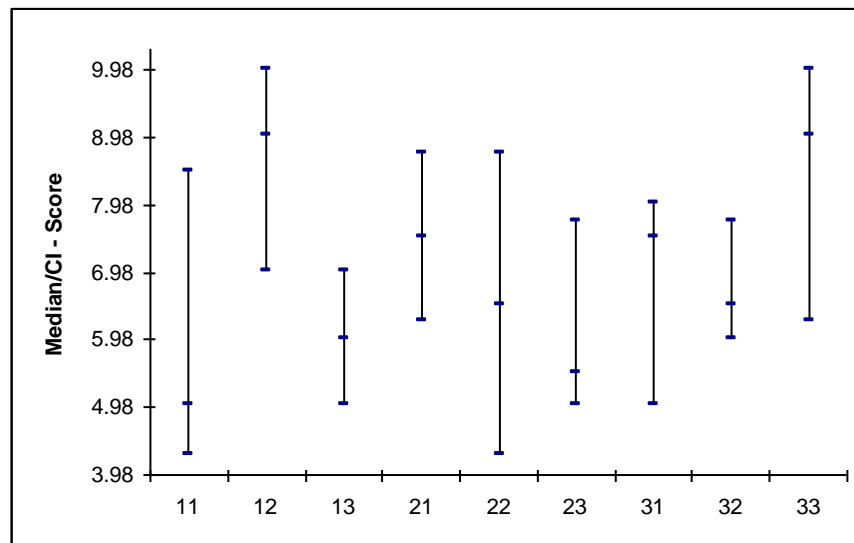
Figure 5-2. Graph of 95 Percent CI for Median for Salience Attribute Influence on Value Creation

From the graph, it is evident that pairings 12, 21, 31, and 33 have medians above seven which would indicate that these interactions between the salience attribute is important or very important influence on the value creation process. Additionally, 13, 22, and 32 have medians above six, which is the ordinal value for the moderately important, but may not be statistically significant. However, 11 and 23 have much lower median scores and therefore, using the Kruskal-Wallis non-parametric ANOVA test, there is a strong expectation that the medians will be statistically significantly different. Again, the null hypothesis proposes that all medians are equal, while the alternative hypothesis is that at least two of the medians are different, with a level of significance selected as 0.05. Given the visible differences of the medians, the expected result of rejecting the null hypothesis is confirmed with a p-value of 0.027.

Table 5-2. Kruskal-Wallis Analysis

Kruskal-Wallis Nonparametric ANOVA: Score	
H_0: Median 1 = Median 2 = ... = Median k	
H_a: At least one pair Median i $\neq$ Median j	
Kruskal-Wallis Statistic (H)	17.363
DF	8
P-value (2-sided, adjusted for ties)	0.0265

With the decision to reject the null hypothesis that all medians are equal, there is strong evidence to suggest that the influence relationships are different. Also insightful is noting that the medians were spread across the ordinal scale. This indicates that while the influence relationships are different, there are some that appear to important and others that are not. Using the interactive analysis approach, more focused testing can be performed using this data.

5.7.2 Proposition 2: The program enterprise architecture influence stakeholder salience attributes.

While the respondents were directly asked to assess the candidate stakeholder salience, the extended data of respondent justifications for these assessments provided rich qualitative data on the influence of the enterprise architecture on the perceived stakeholder salience. These justifications were recorded, transcribed, and coded

(Charmaz 2006) for frequency (Glaser and Strauss 1967) and intensity (Eisenhardt 1989), using the Enterprise Architecture Views (Nightingale and Rhodes 2004; Rhodes et al. 2009).

As a result of this data processing, the following table is presented reflecting the median scores for the influence relationships of the Enterprise Architecture Views (EA) on the Stakeholder Salience attributes (SS):

Table 5-3. Median Scores for Influence of EA on SS

	Urgency		Power			Legitimacy		
	Criticality	Importance	Coercive	Utilitarian	Symbolic	Pragmatic	Moral	Cognitive
Policy/EF	2	8	9	5	5	8	2	3
Strategy	2	2	2	5	2	2	2	2
Process	7	5	8	8	5	8	2	8
Organization	7	7	10	5	8	5	8	5
Knowledge	2	5	5	5	2	8	2	8
Infra/Info-Structure	2	2	5	7	5	2	4	5
Product	8	8	6	7	8	7	5	5
Service	2	5	5	7	5	5	5	5

From inspection, it would seem that the medians are different. Using the table to illustrate the pairs for identifying the pairs, it follows that the first influence pairing would be Policy/External Factors and Criticality; second is Policy/External Factors and Importance; until the sixty-fourth pairing of Service and Cognitive(Legitimacy). This establishes 64 levels for the factor of influence-pairing. By using the Kruskal-Wallis Test we gain sensitivity over the extended Medians Test (Conover 1999) and leverage all of the information from the observations. With sixty-four levels for the influence of Enterprise Architecture (EA) on Stakeholder Salience Attribution (SS), the graph of the

medians for the various levels is very compressed; however, the graph easily depicts the difference across the levels in terms of the medians (shown on the y-axis.)
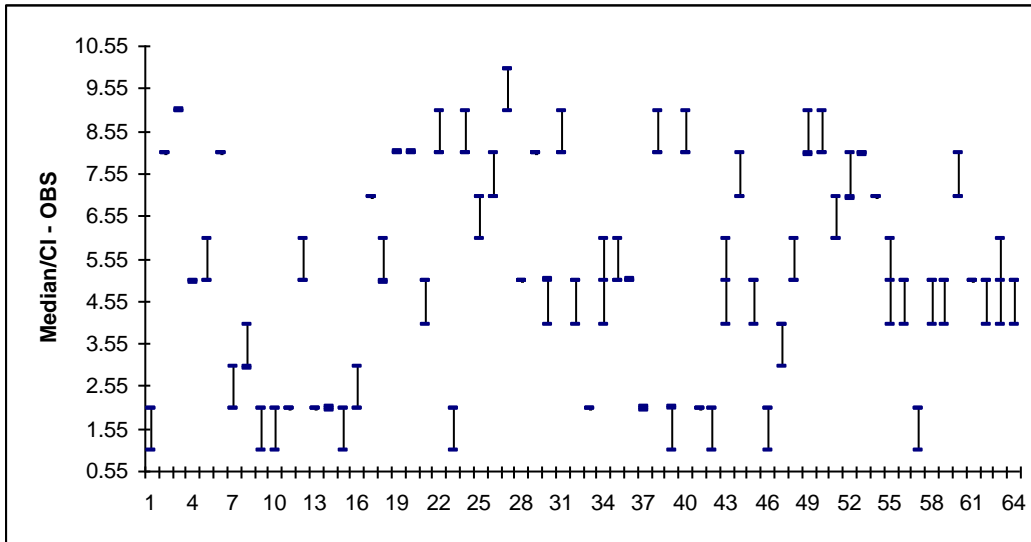
Figure 5-3. Medians of Influence of EA on SS

The p-value of the Kruskal-Wallis test was 0.000. The decision is to reject the null hypothesis that all the medians are the same and conclude that more than one of the influence pairings has greater influence than others. This again allows more focused propositions for data analysis.

5.8 Refine Hypothesis

5.8.1 Stakeholder Salience Influence on Value Creation

From the analysis of the initial proposition, several influence relationships appeared to be important. The graph also indicates the observations were not symmetric by the location in the range of the median. This would support continued usage of the non-parametric Sign test (rather than the Wilcoxon test). Based on ordinal values for the Likert scale, Any median that is equal to six is moderately important; however, if there is strong evidence to suggest that the median is great than six, that influence relationship is said to be important or very important. Table 5-2 illustrates the influence pairings for Stakeholder Salience (SS) on Value Creation (VC). The results of the Sign test for the nine influence relationships are shown in the following table.

Table 5-4. Sign Test for SS on VC

1 Sample Sign Test for Medians: Score									
H₀: Median = 6									
Hₐ: Median Greater Than 6									
Interaction - Code	11	12	13	21	22	23	31	32	33
Count (N)	12	12	12	12	12	12	12	12	12
Median	5	9	6	7.500	6.500	5.500	7.500	6.500	9
Points Below 6	8	0	5	2	5	6	4	2	2
Points Equal To 6	0	1	2	1	1	2	1	4	1
Points Above 6	4	11	5	9	6	4	7	6	9
P-value (1-sided)	0.9270	0.0005	0.6230	0.0327	0.5000	0.8281	0.2744	0.1445	0.0327

These results suggest that there is strong evidence to suggest that the medians for Power-Proposition, Identification-Legitimacy, and Urgency-Delivery are greater than six and to conclude that these influence relationships are important or very important. The influence relationship of Urgency-Proposition had a median of 6.5. This would indicate that the sixth-ranked observation was a 6 and the seventh ranked observation was a 7, with the midpoint of the two being 6.5. However, based number of other observations below 6, there was not strong evidence to conclude that that the median was greater than with statistical significance. Reviewing the qualitative data, there were several perspectives that saw a very important influence by the candidate stakeholders that were higher in the organizational hierarchy; however, the candidate stakeholders that were operating in the lower levels of the enterprise stated that the urgency should influence the proposition aspects of the enterprise value creation process, it currently was not. These results provide the following conclusions:

The influence of	Power	on	Identification	**is not** important or very important.
The influence of	Power	on	Proposition	**is** important or very important.
The influence of	Power	on	Delivery	**is not** important or very important.
The influence of	Legitimacy	on	Identification	**is** important or very important.
The influence of	Legitimacy	on	Proposition	**is not** important or very important.
The influence of	Legitimacy	on	Delivery	**is not** important or very important.
The influence of	Urgency	on	Identification	**is not** important or very important.
The influence of	Urgency	on	Proposition	**is not** important or very important.
The influence of	Urgency	on	Delivery	**is** important or very important.

Based on these results, the following refined propositions are provided:

P1a: Stakeholder Legitimacy strongly influences Enterprise Value Identification

P1b: Stakeholder Power strongly influences Enterprise Value Proposition

P1c: Stakeholder Urgency strongly influences Enterprise Value Execution

Having revisited the data to refine the hypotheses for the influence of stakeholder salience on value creation, we now revisit the data with respect to the influence of Enterprise Architecture on Stakeholder Salience.

5.8.2 Enterprise Architecture Views Influence on Stakeholder Salience.

With the conclusion that at least one relationship of the influence of an Enterprise Architecture view on Stakeholder Salience Attribute was greater than the others, a statistical test was conducted to identify any relationships that were important or very important. This was accomplished using the Sign test based on the ordinal data set of 480 observations for each of the eight enterprise architecture views. The results of this test are presented in the following table:

Table 5-5. Sign Test for Important EA-SS Influence

1 Sample Sign Test for Medians: X								
H_0: Median = 6								
H_a: Median Greater Than 6								
EAV	Infra/Info-Structure	Knowledge	Organization	Policy/EF	Process	Product	Service	Strategy
Count (N)	480	480	480	480	480	480	480	480
Median	4	5	7	5	7	7	5	2
Points Below 6	344	287	145	257	151	120	308	450
Points Equal To 6	58	60	70	43	60	73	79	14
Points Above 6	78	133	265	180	269	287	93	16
P-value (1-sided)	1.0000	1.0000	0.0000	0.9999	0.0000	0.0000	1.0000	1.0000

The sign test's null hypothesis for this test construct was that the median is 6, while the alternative was that the median is greater than six. Based on the analysis presented, Organization, Process, and Product had p-values sufficiently low to reject the null hypothesis and conclude that their influence on stakeholder salience is important or very important. This result is not surprising given the literature review's emphasis of the task environment and organizational structure on bureaucracies (Weber 1946; Wilson 1989). The evidence of the influence of product was indicative of how enterprise architecture influence multiple system properties (Whitney et al. 2004).

In contrast, the data is tested to identify enterprise architecture views that are unimportant or of little importance. This is accomplished using the sign test with a null hypothesis that the median is equal to five, while the alternative is that the median is less than five. The results of this test are presented in the following table:

Table 5-6. Sign Test for Unimportant Important EA-SS Influence

1 Sample Sign Test for Medians: OBS							
H₀: Median = 5							
Hₐ: Median Less Than 5							
EAV	Infra/Info-Structure	Knowledge	Organization	Policy/EF	Process	Product	Service	Strategy
Count (N)	480	480	480	480	480	480	480	480
Median	4	5	7	5	7	7	5	2
Points Below 5	282	236	83	206	109	67	223	427
Points Equal To 5	62	51	62	51	42	53	85	23
Points Above 5	136	193	335	223	329	360	172	30
P-value (1-sided)	0.0000	0.0213	1.0000	0.8076	1.0000	1.0000	0.0059	0.0000

The results are interesting based on the number of enterprise architecture views that were found to be unimportant or of little importance. It is important to note the context of this enterprise. Recall that this enterprise program is pre-milestone B. This confers that there are no prototypes that are in production as technologies are still being integrated into the platform. As a result, there is essentially no infrastructure other than the development locations. Likewise, at this stage of the program enterprise the task environment is very segregated to the respective functional organizations. The extended data indicated that there was very little knowledge that was shared outside organizational boundaries. The data also indicated that in addition to a lack of exchange of knowledge, there was little exchange of support. Therefore by definition, the service sub-architecture was virtually nonexistent. The enterprise architecture view that was the least influential was strategy. In comparison to the probability of success reports the strategic fit of the enterprise was contradictory. According to the probability of success reports, the strategic alignment of the program was very good with 14 of 15 points for this metric. In attempting to triangulate this score with the candidate stakeholders' responses, it was apparent that while the alignment of the capabilities to be delivered by the program enterprise to the national level enterprise were constant, the strategic enterprise architecture view across a program enterprise was not well defined nor understood. Based on the data that was collected, it is also insightful to examine which stakeholder

salience sub-attributes were most influenced or least influenced by these enterprise architecture views.

Using the similar approach, each stakeholder salience sub attribute was tested to have a corresponding important or very important influence relationship with the enterprise architecture views. The results of this test are illustrated in the following table:

Table 5-7. SS that had Important Influence by EA

1 Sample Sign Test for Medians: OBS							
H_0: Median = 6							
H_a: Median Greater Than 6							
SAL_SA	Coercive	Cognitive	Criticality	Importance	Moral	Pragmatic	Symbolic	Utilitarian
Count (N)	480	480	480	480	480	480	480	480
Median	6	5	3	5	3	6	5	6
Points Below 6	193	271	320	245	366	213	278	176
Points Equal To 6	66	63	30	60	35	57	52	94
Points Above 6	221	146	130	175	79	210	150	210
P-value (1-sided)	0.0923	1.0000	1.0000	0.9997	1.0000	0.5771	1.0000	0.0465

It is evident from these results that utilitarian (power) was most influenced by the enterprise architecture views. Also, coercive (power) was appeared to be influenced by the enterprise architecture, but the evidence was not statistically significant to reach the conclusion. These two results amplify the general comments by those candidate stakeholders that were principally operating at the lifecycle process level. In particular, there were many decisions that were made at much higher levels of the organizational structure that typically had been delegated to lower functional managers. While it was the intent of the higher-level leadership to assist and expedite the successes of this program enterprise, the result of this effort forced an acceleration of work that had significant impacts on the value creation process.

In examining the data for the stakeholder salience sub attributes that were least influenced by the enterprise architecture views the statistical analysis results are presented in the following table:

Table 5-8. SS that had unimportant influence relationships with EA.

1 Sample Sign Test for Medians: OBS								
H_0: Median = 5								
H_a: Median Less Than 5								
SAL_SA	Coercive	Cognitive	Criticality	Importance	Moral	Pragmatic	Symbolic	Utilitarian
Count (N)	480	480	480	480	480	480	480	480
Median	6	5	3	5	3	6	5	6
Points Below 5	140	202	297	196	330	175	206	87
Points Equal To 5	53	69	23	49	36	38	72	89
Points Above 5	287	209	160	235	114	267	202	304
P-value (1-sided)	1.0000	0.6534	0.0000	0.9730	0.0000	1.0000	0.4410	1.0000

The test results all the researchers to conclude that criticality and moral sub attributes were minimally influenced by enterprise architecture. This may seem to contradict the conclusions of the previous paragraph, but it is important to distinguish between the accepted enterprise architecture and the system implementation. The data reflects the inability for the enterprise architecture to mitigate the results of changes to the other stakeholders' criticality. Well the influence of the enterprise architecture on the moral attribute was of little importance will as it was widely accepted that the enterprise inherently had moral legitimacy. Again, this reaffirms, and triangulates, the observed reports for the anticipated contribution of the capabilities to be generated by this program enterprise.

Based on these findings, the initial propositions have been refined and are presented below:

P2a-c: Process, Organization, Product have important or very important influence on Stakeholder Salience attributes.

P2d: Info/Structure, Knowledge, Service and Strategy have low influence on Stakeholder Salience attributes.

P2e: Utilitarian (Power) is most influenced by the current Enterprise Architecture

P2f: Criticality (Urgency) and Moral (Legitimacy) are least influenced by the current Enterprise Architecture.

With these refined propositions, the next step in the methodology is to you view, compare and contrast in the context of the accepted literature.

5.9 Enfolding Literature

The previous section presented the explicit findings based on the data analysis. In the section, the following provides the context of where these findings can be placed in the literature to facilitate addressing gaps or strengthening existing theory. This is a multi-discipline effort that draws from the domains presented in Chapter 2 to reconcile complementary and competing perspectives that are inherent in enterprise engineering systems.

P1a: Stakeholder Legitimacy strongly influences Enterprise Value Identification

One of the controversial aspects of stakeholder theory is the conflicting definitions of legitimacy (Freeman 2004; Jensen 2002). Those that subscribe to the narrow definition seek to provide a basis that definitively includes or excludes those that have "something at risk." (Mitchell et al. 1997) Captured in the extended data, was the implications of strategic and institutional legitimacy (Suchman 1995). The aspects of operational contributions that are the basis of strategy are not requisite in a bureaucracy for a candidate stakeholder to have high institutional stakes based on its position in the organization or process. As a result, stakeholders that demonstrate only legitimacy as their attribute of salience are afforded the opportunity to engage in the value identification effort for the program enterprise. The manner in which organizations operationalize this relationship can have adverse affects as related in the next section.

P1b: Stakeholder Power strongly influences Enterprise Value Proposition

Power is a significant consideration at the program level (Wood 2010). However in a bureaucracy, a stakeholder that has power and legitimacy is said to have authority (Mitchell et al. 1997; Weber et al. 1947). This "dominant" stakeholder has the ability to justifiably influence the decisions that identify the value for the enterprise and determine the manner for the creation of enterprise value. This characterization was particularly insightful for this case with respect to one candidate stakeholder that was added to the list of candidates. The sample's assessments overwhelmingly scored them as high for power and legitimacy based on the escalation of decisions to very high-levels of the Army for oversight to correct the failures of the Comanche program. However, this influence over the decisions was detrimental in the long run as many of the decisions to help alleviate

the process limitations and constraints were identified as contributory to the systemic failures of the program enterprise.

P1c: Stakeholder Urgency strongly influences Enterprise Value Delivery

The failures of serial processes manifest the errors in subsequent phases (Kumar et al. 2000) and are typically not observed until downstream processes fail. Just as the DOD has required a systems engineering lifecycle approach (Redshaw 2010) to be mitigate this risk of systemic failure, the similarity presented in Chapter 2, holds true for the value creation process as when the program enterprise must deliver its promise at a critical event such as a milestone event, the previous errors will be apparent. With the challenges apparent that precipitated the "stop-work-order," the stakeholders that had unmet urgent claims were recognized. The decisions that attempted to maintain the velocity of the program effort, had failed to deliver the value necessary. Based on the data, this would appear to be a surprise; however, the dynamics of this accumulation of unfulfilled value delivery are not only well known, but incorporated in many systems analysis courses (Sterman 2000). By the interactions between the Stakeholder Salience Framework (Mitchell et al. 1997) and the Value Creation Framework (Murman et al. 2002), we see that this proposition captures the influence that while urgent claims on the enterprise that are met can help success, urgent claims that are unmet, will compile and ensure failure. The number of program enterprises cited in government reports that are delayed and over-budget provide reinforcement to this phenomena (GAO 2009).

P2a-b: Process and Organization have important or very important influence on Stakeholder Salience attributes.

Consistently through this research, the strong influence of process and organization upon the bureaucracy is evident for the institutions that interact to form the program enterprise. For this case, the influence of process and organization was of particular interest given the duration in which the enterprise was in existence. However, as presented by foundational work on organization theory, given the canonical task environment, the result will produce a congruent organization design (Daft 1989).

P2c: Product has important or very important influence on Stakeholder Salience attributes.

   As a reminder of the case context, this program was attempting to leverage existing technologies and to integrate them into a functional operational system. In this case, the product has significant impact on the inclusion of stakeholders with the elimination of several commercial stakeholder candidates. The decisions that provide the value propositions can be significantly influenced by the type of product that is produced (Winn 2001; Winn and Keller 2001). While the management might classify this influence as marketing, this research shows that there is a larger dilemma when the enterprise perspective is applied (Gulati and Kletter 2005) to the value creation process (Murman et al. 2002).

P2d: Info/InfraStructure, Knowledge, Service and Strategy have low influence on Stakeholder Salience attributes.

   The finding that these essential enterprise architecture views were of little importance to influence the stakeholder salience initially seems to contradict accepted literature; however, when examining the temporal aspect of enterprise in terms of maturity, this finding is supported. From an info/infrastructure standpoint, the program adopted existing systems that provided management office space, engineering facilities, and existing infostructure for networks, software architectures, and other information technology systems. While this may appear to support the risk mitigation approach of COTS lifecycle approach, it may not support enterprise lifecycle support in terms of maturity. Based on enterprise architecture' influence, explicitly information and supporting information systems, the maturity of the enterprise has great implications (Ross et al. 2006). While this work does not provide an explicit parameterization of time for maturity, there is a cumulative adoption of maturity for enterprise architectures in terms of form and function. This also provides for the consideration of strategy. The level of integration that is need for an approach of using integration must incorporate a sharing of information and knowledge (Venkatraman 1994; Venkatraman and Henderson 1998). This integration provides the basis for developing the type of strategic alliance (Gulati and Kletter 2005; Gulati et al. 2000) commiserate with an integrated program

enterprise. Having used essentially a standard architecture for these views there was little to no differentiation that was apparent in the stakeholders' salience.

P2e: Utilitarian (Power) is most influenced by the current Enterprise Architecture

In this case, utilitarian power was very much influenced by the effect of organization and process, in particular the organization hierarchy and decision-making processes. The three ways to assert influence using this framework are Coercive, Utilitarian and Symbolic. Using the respective definitions, utilitarian (power) is based upon the control of resources and their allocation (Etzioni 1964; Mitchell et al. 1997). Based upon the high degree of influence of the process and organization views, this particular salience attribute was dominated by the resource management decision-making process. Based on the reports, there were early indications of the challenges facing the program. However, the tiered-levels of governance within the Army consistently rationalized the concerns as "something that could be fixed later." This perspective up the decision-chain is consistent with the impact of having a universally accepted understanding of the situation (Hambrick and Mason 1984). While the architecture is not responsible for this section of those decision makers, it provides for the processes, organizational positions, and the products (such as the budget decisions) that empower a stakeholder with the authorities to exercise this type of power (Benz and Frey 2007; Dutton and Jackson 1987). In this case, it is evident that the "lessons" of public governance are not universal within a bureaucracy.

P2f: Criticality (Urgency) and Moral (Legitimacy) are least influenced by the current Enterprise Architecture.

The influence of enterprise architecture on Moral (legitimacy) is directly reflected in the normative aspects of stakeholder theory (Donaldson and Preston 1995; Driscoll and Starik 2004). It is interesting to note that the criticality (urgency) of stakeholders was not influenced by enterprise architecture – this is a contradiction of the existing literature. Based on the review of the extended data and analysis, this salience attribute was influenced in a manner with the exception of the three major enterprise architecture views process, organization, and product. This example speaks directly to the conclusion drawn by other research efforts in the DOD acquisition enterprises (Beard 1976; Sapolsky 1972). These conclusions of the influence of key stakeholders on the processes based on

their organizational position will drive the enterprise toward delivery of specific products. As a result of this richer understanding and reviewing the data, this proposition is refined to exclude critical (urgency) as not being influenced by enterprise architecture views.

5.10 Closure

Interestingly, the basis for the Stakeholder Salience framework was presented for an outward perspective from the "CEO's"-vantage (Agle et al. 1999; Mitchell et al. 1997). However, in this case, this framework would have benefited the enterprise, as the stakeholder that was assessed as having the most authority (power and legitimacy) was not aware of their salience and how imposing this influence impacted other stakeholders' salience, which, as shown, influences the value creation process. As a result, the impact of the identification of the requisite value exchanges across all stakeholders and the proposition adopted on how to deliver the requisite value placed urgent stakeholders in an unfeasible situation. While a public report of the issues responsible leading to the decision to cancel the program have not been released, several internal documents support these findings.

5.11 References

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6 Case 1 Program A

6.1 Background

The third case is the most recent and arguably the most relevant. This statement is made in reference to a number of large-scale defense programs being terminated with more expected (Gates 2009). As a result of these decisions the lifecycle for current systems are increasing. For many airframes in the services, their fleet ages are dramatically increasing. For the Army, the current aerial reconnaissance platform has an average age of 18.5 years since fielding the last block upgrade. (Note: A block upgrade is a significant re-engineering effort for a particular sub-system that may result in the change of the system nomenclature.) This upgrade focused on the sensor suite that provided capability for nighttime/all-weather surveillance; however, many of the avionics, engines, control, navigation systems, and the chassis were carried forward from previous generations. This enhanced the capabilities, but would not have significant impact on the sustainment and supportability of the system (Prouty 1989). Also interesting is the fact that the Army is currently operating with a deficiency of aggregate numbers for the aircraft due to lack of production capability for new aircraft to replace those that are catastrophic losses. These conditions plus the advancements necessary to provide necessary capabilities demanded by the combatant commanders for the enterprise program indicate that there is significant demand for fielding a new aircraft. As mentioned in Chapter 5, there have been two efforts to meet this need that were not successful in fielding to the Army. As a result, the temporal pressure to field a viable system, the current program enterprise was requested, in October 2009, to initiate a significant reengineering effort to produce an aircraft that would meet necessary capability requests for an interim, approximately another 15 years, until a new helicopter could be developed. In March 2010, the Army notified the researcher that the enterprise program was operational for inclusion in the research effort.

6.2 Motivation

Based on the research methodology presented in Chapter 3, this case was included as part of the multiple case design. This case is particularly interesting from a practical and epistemological vantage. This case exemplifies the case study approach for

replication. While the same entities will form the set of candidate stakeholders, there are many new individuals in the key positions due to cyclic personnel turnover in both government and commercial organizations. This would be helpful with both internal and external validity as it supports consideration of the enterprise system more so than a set team of leaders.

6.3 Review Existing Case Studies

From a research methods standpoint, Case 1 is treated independently from this case and was not referenced to inform this case study effort as it will be cross-analyzed in a later section. Likewise, there were minimal case studies available for reference on aviation program enterprises (Matty 2009; Matty et al. 2008) or lifecycle extensions.

6.4 Develop Initial Hypotheses

Chapter 3 develops the logic for the initial hypothesis that served as the basis for each of the cases. The initial hypotheses also served as the basis for the iterative steps of analyzing data, refining hypothesis and enfolding in the literature.

P1: The stakeholder salience attributes influence the enterprise program value creation process.

P2: The program enterprise architecture influence stakeholder salience attributes.

6.5 Crafting Protocols

The protocols described in Chapter 3 were replicated for this case. The data was collected using the instruments and methods described in the following section.

6.6 Collect Data

One of the events scheduled to initiate the value creation process, a special conference was held for all interested parties for both government and commercial organizations. The attendee list for this conference served as the preliminary list of candidate stakeholders. This list would be adjusted as needed based on the interview data. Following the protocol presented in Chapter 3, twenty-five candidate stakeholders were interviewed. The interviews were conducted over a period of five days in person during a conference in Dallas, Tex. in April 2010. The lattice sampling approach (Abbey 1978) was used. The number and structure of assessments were maintained with one

self-assessment and assessments for four other candidate stakeholders. The interviews were conducted by one researcher and were recorded for transcription for data processing in a separate room in the conference area at a time selected by the respondent to minimize distractions due to other scheduled activities. The interviews were conducted in two parts. The first session introduced respondents to the Stakeholder Salience Index assessment (Grossi 2003) by facilitating a self-assessment and collecting extended data (Weiss 1994). The respondent was provided copies of the Stakeholder Salience Index assessment for the four remaining assessments. The second interview was not scheduled sooner that at least one day to allow the respondents sufficient time to complete the assessments. Based on the attendance at multiple days at the conference, all the respondents were able to observe this approach. During second interview, the researcher captured the results of the assessment for the four candidate stakeholders, while recording the justification for the assessments; additional responses for the influence of stakeholder salience on value creation were collected as well. After the conclusion of the interviews, the data was transcribed. The transcriptions and completed assessments were provided to the respondents for review and concurrence. The verified data was then processed and analyzed in accordance with the research protocol.

6.7 Analyze Data

6.7.1 Proposition 1: The stakeholder salience attributes influence the enterprise program value creation process.

The data that was recorded from the interviews was both quantitative from the use of the Likert scale and qualitative from the justifications. The following presents the data analysis supporting consideration of proposition one: The stakeholder salience attributes influence the enterprise program value creation process.

The Likert scale used was an extension of the five point Likert Scale. This was done to avoid confusion as the Stakeholder Salience Index assessment was based on a 10-point scale. In accordance with the study protocol, the data was then placed into a database for statistical analysis. Without the existence of previous literature to provide insight on the expected distribution from this non-parametric analysis techniques were used. In order to identify the relationships of the salience attribute and the value creation process the following pairing were developed:

Table 6-1. Pairing of Salience Attribute to Value Creation

Pairing	Attribute	Value Creation
11	Power	Identification
12	Power	Proposition
13	Power	Delivery
21	Legitimacy	Identification
22	Legitimacy	Proposition
23	Legitimacy	Delivery
31	Criticality	Identification
32	Criticality	Proposition
33	Criticality	Delivery

Nonparametric techniques do not make assumptions of the distributions such as symmetry, modality, etc. These methods seek to draw insight from the observations, rather inference from the parameters that typically are used to define the distribution family (Conover 1999). Most nonparametric techniques use the median as the primary statistic for the measure of central tendency. The following graph illustrates the medians, depicted on the Y-axis, for the nine influence relationships, depicted on the X-axis.
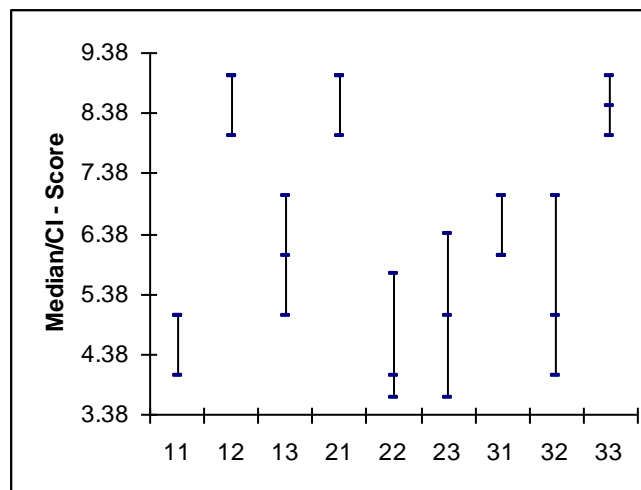
Figure 6-1. Graph of 95 Percent Confidence Interval for Salience Attribute Influence on Value Creation

From the graph, it is evident that pairings 12, 21, and 33 have very high medians, and 22 is low. In structuring the test hypothesis, the objective is to structure the test so that the presence of strong evidence will allow the researcher to reject the null hypothesis. The null hypothesis when comparing these pairing constitutes a multiple sample test. A multiple sample test that compares the medians from the samples is the Kruskal-Wallis test, also known as non-parametric ANOVA. The null hypothesis proposes that all medians are equal, while the alternative hypothesis is that at least two of the medians are different. As is common with hypothesis testing a p-value is computed and then compared against a pre-determined level of significance. The consistent level of significance stated in Chapter 3 was 0.05. Upon inspection of the graph, it was not surprising that the p-value for this test was 0.00.

Table 6-2. Kruskal-Wallis Analysis

Kruskal-Wallis Nonparametric ANOVA: Score	
H_0: Median 1 = Median 2 = ... = Median k	
H_a: At least one pair Median i ≠ Median j	
Kruskal-Wallis Statistic (H)	96.677
DF	8
p-value (2-sided, adjusted for ties)	0.0000

We reject the null hypothesis that all medians are equal and conclude that the influence relationships are different. Based on the strong evidence, the initial hypothesis of stakeholder salience attributes influence the enterprise program value creation process can refined.

6.7.2 Proposition 2: The program enterprise architecture influence stakeholder salience attributes.

Using the qualitative data from the justifications provided for the Stakeholder Salience Index assessments, the researcher processed the extended data to address the second proposition as described Chapter 3. Again, the coding scheme used an approach similar to correlation and not covariance to establish relationships. This approached captured enterprise architecture influence either that enhanced the stakeholder's salience sub-attribute, or had a negative stakeholder's salience sub-attribute; very similar to the coefficient of determination whose range is (0,1) reflects magnitude not direction

(Devore 2000). An influence that was "unimportant" was rarely used in the justifications or was stated as having almost no influence.

Before providing examples of the extended data, the stratification that occurred in the collection of the justifications was explicit in the structure of the Stakeholder Salience Index assessment as the data was provided with reference to a specific salience sub-attribute assessment. Examples of this extended data included the following quotes from various assessments about different candidate stakeholders that had enterprise architecture influence:

> "They are the gate keepers. Anytime we have to request approval for a change in required documentation, they have to approve it." (Process)

> "They are in the hot seat. If they call and say they need something we will try our best to provide it to them when they need it." (Product)

> "We submit our requirements to our headquarters to make sure we can do the work, but we know that those that make the decisions will only give us 70% and hang on to the other 30% until we convince them we need it." (Organization)

The results of the qualitative coding produced a frequency and intensity of influence that was codified using the following Likert scale:

Table 6-3 Likert Scale for Influence

Unimportant	1
	2
Of Little Importance	3
	4
Morderately Important	5
	6
Important	7
	8
Very Important	9
	10

The results of this qualitative data processing were captured in a database, and then analyzed using ordinal data analysis. The following table presents the median values for the influence of the enterprise architecture (EA) views influence on stakeholder salience (SS) sub-attributes:

Table 6-4. Median Influence EA-SS Scores

	Urgency		Power			Legitimacy		
	Criticality	Importance	Coercive	Utilitarian	Symbolic	Pragmatic	Moral	Cognitive
Policy/EF	1	8	10	5	5	8	6	2
Strategy	2	3	2	5	3	2	2	2
Process	8	10	9	9	7	9	3	8
Organization	8	8	9	6	10	5	9	5
Knowledge	5	5	8	5	2	8	2	8
Infra/Info-Structure	6	6	6	8	9	6	9	5
Product	9	6	8	9	9	9	8	5
Service	8	5	5	9	5	6	5	5

The non-parametric test for ANOVA is the Kruskal-Wallis test. This test's null hypothesis is that the sample scores should have the same results, while the alternative is that at least one has larger scores. From the table it was anticipated the samples for each of the influence relationships would be different. The following table presents the results from this analysis.

Table 6-5. Kruskal-Wallis Analysis

Kruskal-Wallis Nonparametric ANOVA: OBS	
H₀: Median 1 = Median 2 = ... = Median k	
Hₐ: At least one pair Median i ≠ Median j	
Kruskal-Wallis Statistic (H)	5444.8
DF	63
p-value (2-sided, adjusted for ties)	0.0000

The result of this test produced a p-value of 0.000. Therefore, the decision was to reject the null hypothesis and conclude that at least one of the influence relationships is higher than the others. This result leads the researcher to explore those enterprise architecture views that either strongly or weakly influences the stakeholder salience.

6.8 Refine Hypothesis

6.8.1 Stakeholder Salience Influence on Value Creation

While Figure 4-1 has already highlighted several influence relationship that we would expect to be important or very important, 13 and 31 appear to have scores that indicate that may be possible. Using the non-parametric sign test, the null hypothesis is that the median is equal to six and the alternative hypothesis is that the median is greater than six. This test method was selected as it was evident that the observations were not symmetric about the median, which is an underlying assumption for the alternative test method, Wilcoxon Rank-Sum Test. This hypothesis allowed for strong evidence to reject the null hypothesis, which leads to the conclusion that the influence relationship is important or very important based on the Likert scale. The results of the statistical analysis for all influence relationships are presented in the following figure.

Table 6-6. Sign Test Results for All Pairings Influence Relationships

1 Sample Sign Test for Medians: Score									
H₀: Median = 6									
Hₐ: Median Greater Than 6									
Interaction - Code	11	12	13	21	22	23	31	32	33
Count (N)	26	26	26	26	26	26	26	26	26
Median	5	9	6	9	4	5	6	5	8.500
Points Below 6	20	1	10	1	18	14	6	14	0
Points Equal To 6	2	0	5	0	0	4	11	2	1
Points Above 6	4	25	11	25	8	8	9	10	25
p-value (1-sided)	0.9999	0.0000	0.5000	0.0000	0.9855	0.9331	0.3036	0.8463	0.0000

The results of this analysis permit the following conclusions:

The influence of	Power	on	Identification	**is not** important or very important.
The influence of	Power	on	Proposition	**is** important or very important.
The influence of	Power	on	Delivery	**is not** important or very important.
The influence of	Legitimacy	on	Identification	**is** important or very important.
The influence of	Legitimacy	on	Proposition	**is not** important or very important.
The influence of	Legitimacy	on	Delivery	**is not** important or very important.
The influence of	Urgency	on	Identification	**is not** important or very important.
The influence of	Urgency	on	Proposition	**is not** important or very important.
The influence of	Urgency	on	Delivery	**is** important or very important.

Based on these conclusions, the following propositions are provided as a result of this

P1a: Stakeholder Legitimacy strongly influences Enterprise Value Identification.

P1b: Stakeholder Power strongly influences Enterprise Value Proposition.

P1c: Stakeholder Urgency strongly influences Enterprise Value Execution.

Based on these refined propositions, the research addresses focusing the second base proposition comprising the proposed integrated framework in Chapter 2.

6.8.2 Enterprise Architecture Views Influence on Stakeholder Salience.

Given that there was strong evidence to suggest that Enterprise Architecture influences Stakeholder Salience, the data is revisited to focus and refine propositions. Continuing to use non-parametric analysis methods, the next step is to explicitly test for important and unimportant influence relationships. Structuring the data set of observations, the influence of each of the Enterprise Architecture views can be tested for influence on Stakeholder Salience. This is accomplished using the Sign-test. Given the ordinal values for the Likert scale selected, for an enterprise architecture view to be considered an important or very important influence on stakeholder salience, there must be strong evidence to suggest that the median is greater than six. Likewise, for an enterprise architecture view to be unimportant or of little importance to influence stakeholder salience, then their must be strong evidence to suggest that the median is less than five.

As there were twenty-five respondents, sample size may initially appear to be small; however, based on the partitioning in the data collection for the influence relationships, the observations increase dramatically at a rate of sixty-four observations per respondent per assessment or 8000 total observations. This is considered a large sample size, which helps the efficiency of the statistical methods. The results of the calculations for the important influence are presented:

Table 6-7. Sign Test for Important EA-SS Influence

1 Sample Sign Test for Medians: X								
H₀: Median = 6								
Hₐ: Median Greater Than 6								
EAV	Infra/Info-Structure	Knowledge	Organization	Policy/EF	Process	Product	Service	Strategy
Count (N)	1000	1000	1000	1000	1000	1000	1000	1000
Median	7	6	8	6	8	8	6	3
Points Below 6	298	475	245	479	190	185	431	908
Points Equal To 6	162	135	113	109	53	90	179	53
Points Above 6	540	390	642	412	757	725	390	39
P-value (1-sided)	0.0000	0.9983	0.0000	0.9886	0.0000	0.0000	0.9286	1.0000

Based in the examples quotations presented above, the results for Organization, Process and Product are not surprising. However, the significance of Infra/Info-structure is worthy of further discussion. The data that supported this centered on the fact that while this program enterprise has been reengineered for new capability, the infrastructure and the infostructure is being carried forward and does not require the typical start-up investments. The insight appears unique to this context, especially when further analysis reveals that this enterprise architecture view had very important influence on Moral (legitimacy) and Utilitarian and Symbolic (power). While Utilitarian power can be generated rather quickly based on the resource management scheme, Symbolic (power) is accrued slowly over institutional generations (Hadley 1986).

The analysis now seeks to identify current enterprise architecture views that are unimportant for influencing the stakeholder salience. This test is structured by testing for significant evidence that the median is less than five. The results are presented in the following table:

Table 6-8. Sign Test for Unimportant EA-SS Influence

1 Sample Sign Test for Medians: OBS								
H$_0$: Median = 5								
H$_a$: Median Less Than 5								
EAV	Infra/Info-Structure	Knowledge	Organization	Policy/EF	Process	Product	Service	Strategy
Count (N)	1000	1000	1000	1000	1000	1000	1000	1000
Median	7	6	8	6	8	8	6	3
Points Below 5	136	369	143	379	128	108	260	833
Points Equal To 5	162	106	102	100	62	77	171	75
Points Above 5	702	525	755	521	810	815	569	92
P-value (1-sided)	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000

The results allow the conclusion to be drawn that in the current enterprise architecture, strategy is not important in influencing the current stakeholder salience. The strict definition of the acquisition strategy is the plan to adapt the DOD Lifecycle Framework to meet program specific milestones given cost, schedule, and performance targets. However, in researching acquisition doctrine, a more appropriate representation of strategy is the approach for the acquisition approach whether the system will use incremental (block) delivery of capability or a spiral development where technologies are integrated based on maturity rather than as a unified upgrade. When respondents were probed about this perspective, the response was that the same efforts and oversight was required for either "strategy" but there was a general expectation that spiral acquisition should help mitigate schedule risk. The analysis continued to next perspective in looking at which salience sub-attributes were influence in an important or unimportant manner by enterprise architecture.

The existing enterprise architecture was important to Criticality and Importance, both sub-attributes of Legitimacy, Coercive and Utilitarian, both Power, and Pragmatic and Pragmatic, Legitimacy. These results are very insightful about the widespread influence that Enterprise Architecture has on the Stakeholder Salience. Given the recent reengineering for the program enterprise, this confirms the impact this effort had on the program enterprise. None of the Stakeholder Salience Sub-attributes had unimportant influence relationships from Enterprise Architecture. It is worth discussion the previously mentioned sub-attributes of Moral and Symbolic. Review of the data indicated the specific relationship of info/infrastructure was very high as discussed, but

other influence relationships were moderately important. These results allow the refined propositions to be presented as follows:

P2a-d: Process, Organization, Product, Info/Infrastructure have important or very important influence on Stakeholder Salience attributes.

P2e: Strategy has low influence on Stakeholder Salience attributes.

P2f-j: Coercive and Utilitarian (Power), Criticality and Importance (Urgency), and Pragmatic (Legitimacy) are most influenced by the current Enterprise Architecture.

6.9 Enfolding Literature

P1a: Stakeholder Legitimacy strongly influences Enterprise Value Identification

This is related to this case based on recent findings about DOD acquisitions based on Dominant Mission Emphasis (DME) for material solutions (Gillespie 2009). Initially, it may appear that these findings are contradictory, where stakeholders that lack legitimacy are influencing the value identification process; however, continuing to relate the two findings, the results on DME actually help to substantiate the finding that stakeholders that have legitimate claims such as end-users or their representatives are provide the inputs for consideration in the value creation process. However, this does not ensure perfect value creation as discussed in the next section.

P1b: Stakeholder Power strongly influences Enterprise Value Proposition

One of the major challenges in decision-making is the approach known as alternatives-focused thinking. This approach has several shortfalls: viable alternatives are not considered, objectives identified are only means to the address consequences, lack of logical match between alternatives and objectives. (Keeney 1992) While Gillespie's findings focused on the identification of requirements, the reason this effort is informative is that the DME had been "socialized" through informal influence mechanisms to stakeholders rather than technical processes altering the value proposition (Gillespie 2009). This observation reinforces and amplifies the assertion of the need to codify and understand the influence of stakeholders' power. From the case presented here, it is evident that a holistic perspective using the enterprise architecture provides this qualitative insight.

P1c: Stakeholder Urgency strongly influences Enterprise Value Delivery.

In looking at the influence of urgency on enterprise value delivery, the two sub-attributes of urgency are particularly useful: importance and criticality (Grossi 2003). From the developing literature on enterprises, the approaches differ from traditional firm interactions (Allen et al. 2004; Sheffi 2005; Womack et al. 1991). Such methods as "just-in-time" or *kanban* techniques dramatically increase the sensitivity to the timing of value exchanges. This is holds true for both production and service related areas (Liker 2004). In recent years, these approaches have been increasingly adopted by the DOD in all institutional areas, especially those that directly support the combatant capabilities. (McGrath 2010).

Given that the Value Creation Framework leverages "systems thinking" for its feedback structure, where the feedback of the delivery process is an input to the identification, one might consider that urgency would have influence on the Identification process. Some literature on expedited decision-making would convolute or even omit the deliberate process of Identification (Weick 1995). This is not the context for the discussion presented. However, the question of influence is addressed using the data analysis, Table 6-5, with a relatively low p-value of 0.3036. While this was not sufficient to reject the null hypothesis, it does indicate that there is some evidence to consider there is some moderate influence but not important or very important.

P2a-d: Process, Organization, Product, Info/Infrastructure have important or very important influence on Stakeholder Salience attributes.

Reviewing these findings, the fact that the process, organization, and product are important or very important to influence stakeholder salience are expected based on the characteristics of bureaucracy (Weber 1946), the emphasis of the system engineering methodologies employed (Redshaw 2010). However, as previously discussed info/infrastructure's influence was principally due to the amount of info/infrastructure existing. Manufacturing plants, operational information systems, etc. provided the virtual and physical means to initiate the value creation process. With these virtual and physical pathways in place, the organizations, process, were already connected, and provided established product architecture.

P2e: Strategy has low influence on Stakeholder Salience attributes.

Based on the strategic architecture for the goals, objectives, the business model, etc. we find that all of this was established prior to the initiation of the program enterprise by leverage an existing enterprise. This is interesting given that while the similar organizations were utilized with 22 of the 23 organizations from Case 1 (two additional candidate stakeholders were included), the business model was changed in terms of the lead for systems integration. This role was changed from industry partner to the government program office. Interestingly this had little change in the salience assessment. The extended data reflected that this was principally to the well-known and accepted rules for each of the candidate stakeholders through standard operating procedures. This reinforced the finding of the influence of process and organization and is supported by the organizational literature (Shapira 1997; Simon 1997)

P2f-j: Coercive and Utilitarian (Power), Criticality and Importance (Urgency), and Pragmatic (Legitimacy) are most influenced by the current Enterprise Architecture.

There is a consistent theme that is pervasive across these salience sub-attributes. This theme is authority – the combination of power and legitimacy (Mitchell et al. 1997; Weber et al. 1947). This insight for authority is an important finding from a theoretical standpoint as it explicitly connects the influence that enterprise architecture has on one of the dominant traits that exist for a given stakeholder in the bureaucracy. This finding demonstrates that a holistic approach is necessary to align stakeholder salience within the enterprise.

6.10 Closure

This case examined the reengineering of an existing program enterprise to provide a necessary capability to the combatant commanders. This material solution will fulfill a principle value proposition through the requisite value exchanges among the enterprise stakeholders. This is accomplished through the enterprise value creation process (Murman et al. 2002). The stakeholders that comprise the program enterprise influence this value creation process based upon their salience attributes. These case findings conclude that the legitimacy of a stakeholder is an important influence on the value identification; the stakeholder's power is and important influence on the value

proposition process; and the stakeholder's urgency is an import influence on value delivery process.

The stakeholder's salience attributes are influenced by the enterprise architecture. Specifically, the process architecture, organization architecture, product architecture, and info/infrastructure architecture are important influences on the stakeholder salience attributes. The salience sub-attributes that are importantly influenced by the architecture are Coercive and Utilitarian (Power), Criticality and Importance (Urgency), and Pragmatic (Legitimacy). There were no Salience sub-attributes that did not have an important influence relationship based on the enterprise architecture.

These findings are supported by current literature, but offer new insights and extend the understanding of the relationships between two frameworks (Mitchell et al. 1997; Murman et al. 2002). This understanding will be vital for advancing the four perspectives of stakeholder theory (Donaldson and Preston 1995) and its impact on engineering systems.

This case is significant in that this approach of reengineering program enterprises is expected to increase with program restructures evident in this particular capability set. Additionally, with expected budget reductions, programs that are not succeeding will be canceled, extending the lifecycle for program enterprises that may be late in the sustain phase for the material system.

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7 Cross-Case Analysis

7.1 Background/Motivation

The three cases selected provided a rare opportunity to examine three acquisition enterprises operating in a relatively short period of time with nearly complete replication in all aspects of the enterprise architecture, candidate stakeholders, and value creation expectations. However, given these similarities that results of the program enterprises were distinctly different with one program lasting nearly forty years, the second being canceled with out completing engineering and manufacturing development, while the third is still very early in is operations and has yet to hold its first milestone decision. By conducting the three cases independently,

7.2 Develop Initial Hypotheses

The initial hypotheses were developed as part of Chapter 3:

Proposition 1: The stakeholder salience attributes influence the enterprise program value creation process.

Proposition 2: The program enterprise architecture influences stakeholder salience attributes.

These propositions will serve as the starting point for the iterative analysis approach, leveraging the superset of data developed in the three cases by adding the field to discern the case as a sample variable.

7.3 Crafting Protocols

While these propositions were refined following the case study methodology in the respective chapters for the three cases, this cross-case analysis will treat the individual cases as three samples. This approach for cross-case synthesis compares and contrasts the cases and enhances the quality of the analysis by following four principles presented by Yin (Yin 2009):

- Attend to all the data: All the data that was processed for analysis with-in each case is used to provide a larger sample for the respective analytical factors. Given the level of replication across the cases, these samples are consistent with the notion of being from the same population – supporting general inferences about the decision and conclusions for this cross-case analysis.

- Address the most significant aspects: With the larger sample, this will increase the sensitivity of the respective statistical analysis methods by reducing the margin of error for the test statistics. It follows that those findings that were consistent across the cases will persist, and those that were peculiar to a case will not be apparent.

- Address all major rival interpretations: Leveraging the analysis for the cases, those unique findings for a respective case can be identified and considered as possible rival finding and reexamined for special circumstances for corollaries to refined hypotheses.

- Use prior expert knowledge: Based organizational interest for this research, several functional subject matter experts offered to review the findings to provide a domain perspective on the results.

Using the superset of the database, similar non-parametric tests, such as the Kruskal-Wallis test can be conducted for the influence relationships as well as to test for differences across the samples. The analysis to compare the cases is vital to ensure the internal validity for the research. If significant differences for the influence relationships are identified the Sign test will be utilized to identify extreme influence relationships based on the extended Likert (ordinal) scale.

As there was no intention of collecting data explicitly for the cross-case analysis, all data was collected following the protocols developed for the individual cases. With this intention, the pairings for the Stakeholder Salience Index assessments were maintained as much as possible to reduce variation based on the assessment and corresponding justifications for proposition 2.

7.4 Collect Data

Each case had used a lattice sampling approach. Changes to the pairing were minimized for case 1 and case 3 where one candidate stakeholder from case 1 was not sampled and three candidate stakeholders were added in case 3. For consideration of the influence relationships for Stakeholder Salience on Value Creation, this resulted in 93.9 percent alignment between cases 1 and 3 with 83.3 percent of Case 2 observations being aligned to cases 1 and 3. For the influence relationships of Enterprise Architecture influence on Stakeholder Salience, this resulted in a 95.5 percent alignment of the

assessments between case1 and case 3. Case 2 observations aligned to 63.3 percent of case 1 observations, due to the exclusion of nearly 13 candidate stakeholders from Case 1 and the addition of 4 new candidate stakeholders. These additions were principally due to the different Acquisition Category level.

Using statistical analysis, the number of observations in a data set requires significant consideration. Parametric methods for multiple samples often use pooled estimates to account for differences in sample size. However, for the non-parametric methods used in the analysis, the principle calculation is the ranking of the observation among all observations. As a result, the sample size consideration is mitigated much like the results of a probability plot where the percentile of an observation corresponds to its position in the ranked list of observations. In a sense, this is sampling from the same population, so observations will occur with respect to a similar measure of central tendency. Infrequent observations that that may result in a larger sample having higher rankings will also contain infrequent observations that occur that will result in the larger sample to have lower rankings. This is true whether the population is symmetric or skewed (Conover 1999). Based on this result, the Kruskal-Wallis test is also utilized to examine the effects of the case that produce

7.5 Analyze Data

7.5.1 Proposition 1: The Stakeholder Salience Attributes Influence the Enterprise Program Value Creation Process.

In each of the cases, there was strong evidence to suggest that stakeholder salience attribute influence value creation. Using the superset of data, the following graph depicts the nonparametric confidence intervals for the influence relationships median values.
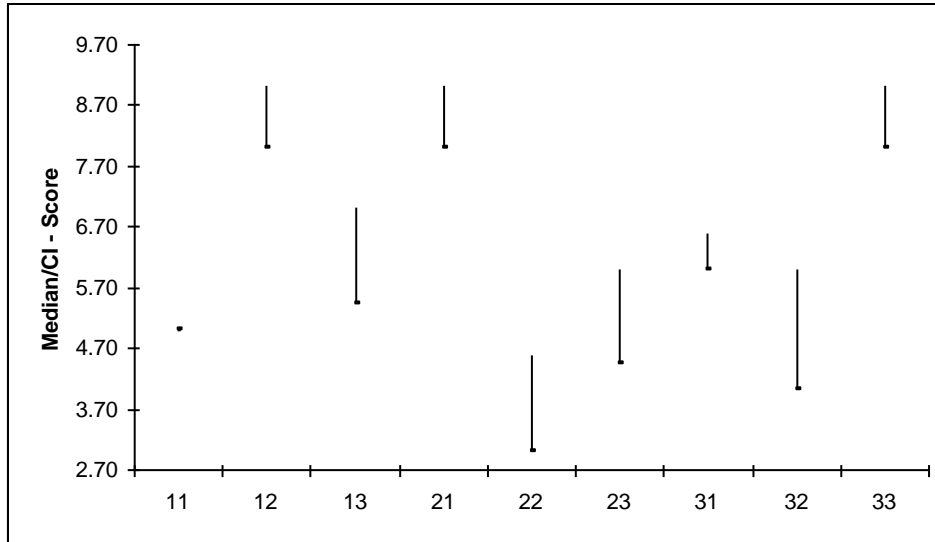
Figure 7-1. SS influence on VC (Superset Data)

From the graphical analysis, the influence relationships appear to be different. The Kruskal-Wallis test findings show that there is strong evidence to conclude that there is a difference in the influence relationships.

Table 7-1. Kruskal-Wallis Test for SS influence on VC (Superset Data)

Kruskal-Wallis Nonparametric ANOVA: Score	
H_0: Median 1 = Median 2 = ... = Median k	
H_a: At least one pair Median i ≠ Median j	
Kruskal-Wallis Statistic (H)	249.08
DF	8
p-value (2-sided, adjusted for ties)	0.0000

Bases on the p-value from this result, the decision is made to reject the null hypothesis that the influence relationships are the same and conclude that there is strong evidence to suggest that the influence relationships are different. This permits follow-on analysis to examine each of these relationships.

7.5.2 Proposition 2: The Program Enterprise Architecture Influence Stakeholder Salience Attributes.

The second proposition was supported in each of the cases and refined. However, the findings in these refinements varied across the cases. Using the superset of data, the same analysis used in the cases is performed to assess whether the influence relationships

of Enterprise Architectures (EA) on Stakeholder Salience (SS) are the same or different. As a summary of superset of data, the medians for the respective relationships are shown in the following table.

Table 7-1. Influence of EA on SS (Superset)

	Urgency		Power			Legitimacy		
	Criticality	Importance	Coercive	Utilitarian	Symbolic	Pragmatic	Moral	Cognitive
Policy/EF	1	7	9	5	5	8	4	2
Strategy	2	2	2.5	5	2	2	2	2
Process	8	9	8	9	6	9	2	8
Organization	8	8	9	6	9	5	9	5
Knowledge	4	5	5	5	2	9	2	8
Infra/Info-Structure	5	5	5	8	8	5	8	5
Product	9	5	8	8	8	8	6	5
Service	2	5	5	8	5	5	5	5

It would appear that the medians are different; however, in order to directly address all the data available, the statistical analysis is used incorporating all the observations. The results of this analysis are shown in the following table.

Table 7-2. Kruskal-Wallis Test for EA on SS (Superset)

Kruskal-Wallis Nonparametric ANOVA: OBS	
Test Information	
H_0: Median 1 = Median 2 = ... = Median k	
H_a: At least one pair Median i $\neq$ Median j	
Kruskal-Wallis Statistic (H)	12184
DF	63
p-value (2-sided, adjusted for ties)	0.0000

The p-value confirms that there are differences across the influence relationships for the levels that Enterprise Architecture influences Stakeholder Salience. This suggests that further analysis is needed to focus and refine the proposition for the influence relationships.

7.6 Refine Hypothesis

7.6.1 Proposition 1: The stakeholder salience attributes influence the enterprise program value creation process.

In each of the three cases, the propositions were refined to focus the proposition leveraging all of the data. Using similar statistical analysis, it is expected that the results will be consistent. This is due to the statistical method utilized – the Sign test.

The method essentially applies a binomial test on the proportion of success, defined as an observation that exceeds the hypothesized value and then conducts a hypothesis test where the probability of success is 50 percent. While the test has strong historical precedence, the test is extremely versatile (Conover 1999). In terms of efficiency, measured by the number of observations required for a test to produce similar level of significance, the Sign test is at least 0.86 efficient compared to the parametric t-test for any distribution, while avoiding the assumptions of normality that lead to testing errors (Devore 2000).

Using this test to identify those Stakeholder Salience attributes (SS) – Value Creation process (VC) relationships that are important or very important, the following results are provided:

Table 7-3. Sign Test for Important SS-VC Influence

1 Sample Sign Test for Medians: Score									
Test Information									
H_0: Median = 6									
H_a: Median Greater Than 6									
Interaction - Code	**11**	**12**	**13**	**21**	**22**	**23**	**31**	**32**	**33**
Count (N)	61	61	61	61	61	61	61	61	61
Median	5	9	6	9	4	5	6	5	9
Points Below 6	44	1	23	3	46	36	15	35	2
Points Equal To 6	9	1	12	1	1	13	23	10	2
Points Above 6	8	59	26	57	14	12	23	16	57
p-value (1-sided)	1.0000	0.0000	0.3877	0.0000	1.0000	0.9999	0.1279	0.9974	0.0000

These results are consistent with the findings in each of the three cases for identifying those relationships that are important or very important in terms of the stakeholder salience attributes that influence the respective value creation process. The following analysis continued this effort to identify any relationships that are not influential.

Table 7-4. Sign Test for Unimportant SS-VC Influence

1 Sample Sign Test for Medians: Score									
Test Information									
H_0: Median = 5									
H_a: Median Less Than 5									
Interaction - Code	**11**	**12**	**13**	**21**	**22**	**23**	**31**	**32**	**33**
Count (N)	61	61	61	61	61	61	61	61	61
Median	5	9	6	9	4	5	6	5	9
Points Below 5	22	1	9	0	38	23	2	26	2
Points Equal To 5	22	0	14	3	8	13	13	9	0
Points Above 5	17	60	38	58	15	25	46	26	59
p-value (1-sided)	0.2612	1.0000	1.0000	1.0000	0.0013	0.6673	1.0000	0.5551	1.0000

Based on this result using the terminology of the Likert scale, the Legitimacy of a candidate stakeholder is unimportant to influence the Value Proposition. This result will be further examined based on the existing literature.

It is especially interesting that the findings were so consistent looking at the three cases. In order to examine this perspective of internal validity, the Kruskal-Wallis test can be constructed to test if there were differences in the responses. If the null hypothesis is rejected, meaning there is a difference among the cases, this increases the validity since the influence results may be different, but the important relationships were still significant and identified. The following graph shows the graph of the median confidence intervals.
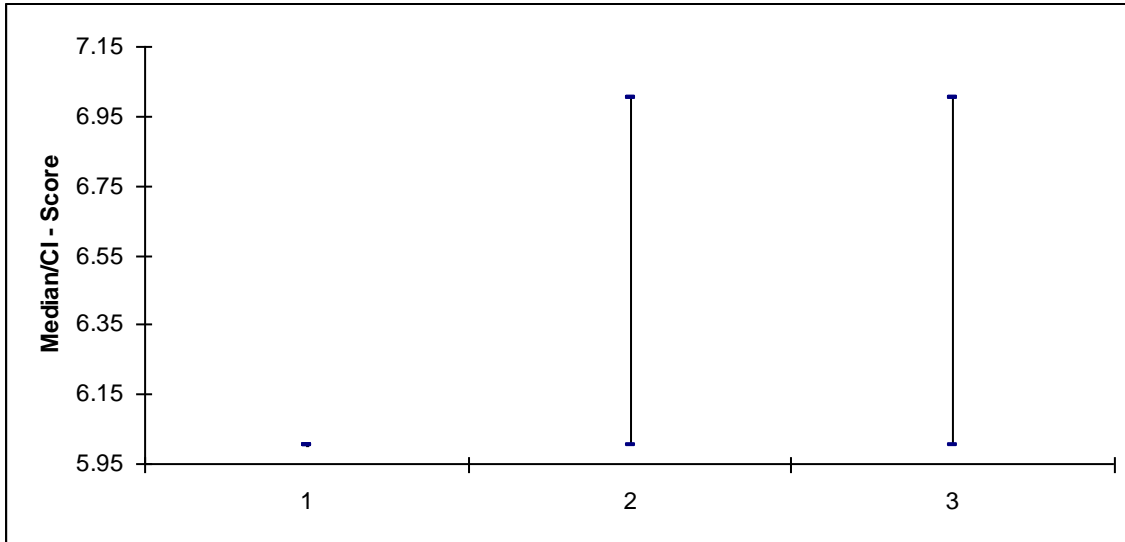
Figure 7-2. Case Median Confidence Intervals

Interpreting this graph, Case 1 was very consistent producing a 95 percent confidence interval that the median is (6, 6), while in Cases 2 and 3, this 95 percent confidence interval is (6, 7). Using this non-parametric method propagates the ordinal scale, where if a parametric approach had been used, it is likely that the intervals would have had decimal values based on the assumption of a continuous domain for the population. As a result of this analysis, the null hypothesis is rejected and the conclusion is there is strong evidence to suggest that the samples are different. This enhances the internal validity of the analysis.

7.6.2 Proposition 2: The Program Enterprise Architecture Influence Stakeholder Salience Attributes.

In reviewing the three cases, the refined propositions varied much more for which Enterprise Architecture views influence stakeholder salience attributes; however, there were some consistent findings. As previously discussed, the non-parametric methods will account for the deviation in sample size across the cases. Similar analysis as was conducted with-in the cases is conducted, with an expectation of those views that consistently were identified as important or unimportant were persistent across all the observations and provide strong evidence. The following graph illustrated the 95 percent confidence intervals for the 64 influence relationships. The graph is not presented to provide detailed values, but to reflect that apparent differences in the expected value for the respective influence relationship's median value.
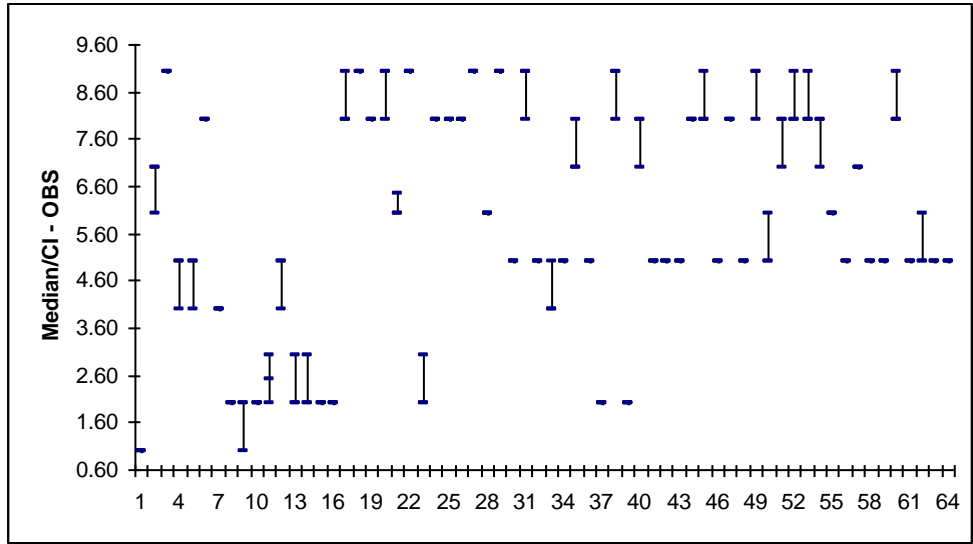
Figure 7-3. 95 Percent CI for EA-SS Influence Relationships

As the findings from using the Kruskal-Wallis test supported follow-on analysis, each influence relationship was tested in order to conclude if there was strong evidence to suggest that the Enterprise Architecture View influence was important or unimportant and if a Stakeholder Salience sub-attribute had important or unimportant influence by enterprise architecture views. The following tables reflect this analysis:

Table 7-5. Sign Test Important EA Influence Relationships

1 Sample Sign Test for Medians: OBS								
H_0: Median = 6								
H_a: Median Greater Than 6								
EAV	Infra/Info-Structure	Knowledge	Organization	Policy/EF	Process	Product	Service	Strategy
Count (N)	2400	2400	2400	2400	2400	2400	2400	2400
Median	6	5	7	5	8	7	5	2
Points Below 6	1014	1250	575	1380	505	612	1202	2242
Points Equal To 6	372	312	297	200	206	273	419	89
Points Above 6	1014	838	1528	820	1689	1515	779	69
P-value (1-sided)	0.5089	1.0000	0.0000	1.0000	0.0000	0.0000	1.0000	1.0000

These results reflect the Enterprise Architecture Views that were consistently identified as important or very important in the influence on Stakeholder Salience sub-attributes. Revisiting the extended data, this influence reflects the current state of the enterprise architecture that is identified as important to influence a candidate stakeholder's current assessment of salience. This does not imply that the other views do

not have the potential to be altered. This distinction will be important as part of the literature analysis and policy analysis.

Table 7-6. Test Unimportant EA Influence Relationships

1 Sample Sign Test for Medians: OBS								
H_0: Median = 5								
H_a: Median Less Than 5								
EAV	Infra/Info-Structure	Knowledge	Organization	Policy/EF	Process	Product	Service	Strategy
Count (N)	2400	2400	2400	2400	2400	2400	2400	2400
Median	6	5	7	5	8	7	5	2
Points Below 5	646	994	338	1136	369	372	750	2072
Points Equal To 5	368	256	237	244	136	240	452	170
Points Above 5	1386	1150	1825	1020	1895	1788	1198	158
P-value (1-sided)	1.0000	0.9997	1.0000	0.0066	1.0000	1.0000	1.0000	0.0000

Based on the results of this analysis, Policy/External Factors and Strategy were unimportant in terms of there influence on stakeholder salience sub-attributes. This was particularly interesting given the review of the literature that has significant references to policy changes at the DOD level and the dynamic environment surrounding the national defense enterprise. Based on extended data analysis, while the policy was either a constraint, stipulating a task that must be done (that is not usually "value added") or a limitation inhibiting an action that would lead to task accomplishment, it was equally challenging across the enterprise and was not regarded as beneficial to a particular candidate stakeholder. The researcher attempted to identify policy analysis within the Army or DOD to triangulate these statements; however, the proponents for the policies could not produce documentation of the analysis that lead to the specific policies that were cited in the data. Likewise, strategy was not existent from the perspective of nearly all of the respondents. When prompted to explain the strategic view for the program enterprise, the respondent would summarize the DOD Lifecycle Management Framework with what tasks needed to be accomplished to pass the next milestone decision.

Using the alternative view of which Stakeholder Salience sub-attributes were part of important or unimportant influence relationships, the statistical analysis produced the following results.

Table 7-7. Test SS Important Influence by EA

1 Sample Sign Test for Medians: OBS								
H₀: Median = 6								
H_0: Median = 6								
H_a: Median Greater Than 6								
SAL_SA	Coercive	Cognitive	Criticality	Importance	Moral	Pragmatic	Symbolic	Utilitarian
Count (N)	2400	2400	2400	2400	2400	2400	2400	2400
Median	7	5	6	6	4	7	6	7
Points Below 6	750	1402	1096	1172	1475	929	1157	799
Points Equal To 6	286	307	224	313	200	269	242	327
Points Above 6	1364	691	1080	915	725	1202	1001	1274
P-value (1-sided)	0.0000	1.0000	0.6422	1.0000	1.0000	0.0000	0.9996	0.0000

These results allow the conclusions that Coercive (Power), Utilitarian (Power) and Pragmatic (Legitimacy) were importantly influenced by the existing Enterprise Architecture. These results are consistent across the cases. The sub-attributes of Power were significant based on the resource management aspects for Utilitarian while Coercive power was based on either approvals for actions or tasking authority. (Note: Tasking authority is the term used for the authority given to an entity within a command structure to give direction to other entities within that same command structure; this typically a particular staff element in the command structure's headquarters.) The Pragmatic (Legitimacy) sub-attribute had a consensus among respondents that the enterprise architecture had "bureaucratic lock-in" for what a stakeholder could or could not contribute, regardless of their abilities; this influence would even restrict their ability to demonstrate this ability.

The Stakeholder Salience sub-attribute that did not have an important influence relationship from the enterprise architecture was Moral (Legitimacy) as reflected in the following table:

Table 7-8. Test SS Unimportant Influence by EA

1 Sample Sign Test for Medians: OBS								
H_0: Median = 5								
H_a: Median Less Than 5								
SAL_SA	Coercive	Cognitive	Criticality	Importance	Moral	Pragmatic	Symbolic	Utilitarian
Count (N)	2400	2400	2400	2400	2400	2400	2400	2400
Median	7	5	6	6	4	7	6	7
Points Below 5	528	1048	945	869	1267	657	890	473
Points Equal To 5	222	354	151	303	208	272	267	326
Points Above 5	1650	998	1304	1228	925	1471	1243	1601
P-value (1-sided)	1.0000	0.1393	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000

The results for Moral were consistent across all the cases and were concluded to be the same with a Kruskal-Wallis test p-value of 0.395. These results have been discussed in the three cases and the extended data only supported the responses that the enterprise architecture did not influence the moral legitimacy of a candidate stakeholder. While not directly related to the logic of the pattern of analysis, it was note worthy that the minimum score for Moral (Legitimacy) was a 5.65 on the Stakeholder Salience Index while overall the candidate stakeholder was not assessed as demonstrating other sufficient levels in the attributes to be categorized as a stakeholder.

Based on these results the following articulate the over-arching propositions from this analysis.

P2a-c: Process, Organization, Product have important or very important influence on Stakeholder Salience attributes.

P2d: Policy/External Factors and Strategy have low influence on Stakeholder Salience attributes.

P2e: Coercive (Power), Utilitarian (Power) and Pragmatic (Legitimacy) are importantly influenced by the current Enterprise Architecture

P2f: Moral (Legitimacy) is least influenced by the current Enterprise Architecture.

7.7 Enfolding Literature

A review of stakeholder literature illustrates the major themes of stakeholder theory contributions extend primarily one or two (Laplume et al. 2008) of the four perspectives (Donaldson and Preston 1995). Building upon the Stakeholder Salience Framework assures that the four perspectives are embedded, and by integrating this framework with the Value Creation Process embeds the enterprise engineering influences.

7.7.1 Proposition 1: The Stakeholder Salience Attributes Influence The Enterprise Program Value Creation Process.

P1a. The stakeholder salience legitimacy influences the enterprise program value identification process.

Value identification is the first process of the value creation process. From the system engineering perspective this is the most critical (Sage and Armstrong 1999). System engineers assert that unless the needs are clearly defined the system cannot meet

engineering field and the enterprise value creation process (Murman et al. 2002). While the comparison of the two supports a similar result for flawed value identification, the enterprise value creation process is recurring with feedback and permits the adjustment and refinement of the value to be created. This is one of the significant contrasts of the two methods.

Stakeholder Theory as defined by Donaldson and Preston, has a normative perspective: "The theory used to interpret the function of the corporation including the identification of moral or philosophical guidelines…" (Donaldson and Preston 1995). While many contributions investigate the extent of the moral guidelines (Driscoll and Starik 2004), the normative perspective infers a relationship that this are implications for the stakeholders' consideration of the results of the enterprise's efforts. This consideration is clearly asserted with the discussion of the Value Creation Process. "How stakeholders find particular worth, utility, benefit, or reward I exchange for their respective contributions to the enterprise." (Murman et al. 2002) The question of how stakeholders influence this value identification is based on the identification of stakeholders and their sense of value. The findings provide explicit insights to close this theoretical gap with respect to this influence relationship.

P1b. The stakeholder salience power influences the enterprise program value proposition process.

This finding compares to the proposition that resource scarcity will initiate stakeholders to leverage their power to ensure that necessary resources are provided for their purposes (Salancik and Pfeffer 1974), in effect altering the value propositions with respect to other now-competitive stakeholders. The benefit for this research finding is that this influence is not limited to scarce resources, but based on organizational objectives. As discussed in case 3, there influence of the salience attribute, power, can be leveraged by stakeholders to alter the value proposition (Gillespie 2009) to support the Dominant Mission Emphasis and focus capabilities on the decision makers outside of the bureaucratic rules and policies (Miewald 1970).

P1c. The stakeholder salience urgency influences the enterprise program value delivery process.

In examining the sub-attributes of urgency, importance and criticality, provide the temporal aspect to the dynamics of the stakeholder framework (Mitchell et al. 1997). While there are many literary contributions that support the notion of the term, Urgency, defined by Mitchell, et al, and infer a relationship with delivery (Dutton and Jackson 1987; Eesley and Lenox 2006; Magness 2007; Parent and Deephouse 2007). These inferences are incomplete, addressing only one sub-attribute of the urgency (Dutton and Jackson 1987), or dealing with a very narrow definition of value that is delivered. One distinction that is informative for this finding is the distinction of the Urgency of the request rather than the Urgency of the stakeholder (Eesley and Lenox 2006). This overly constrains the time-horizon to discrete, countable requests - modern enterprises execute demands for numerous value exchanges. With consideration of this literature, the finding follows sound logic and is empirically supported.

P2a-b: Process and Organization have important or very important influence on Stakeholder Salience attributes.

Within a military organization the common perception of ultimate power control through the hierarchy; however, during periods of intense operational demands, the challenges placed on the service force change resulting in adjustments to the decision making approaches and governance structures (Miewald 1970). As these environmental conditions influence the organization or modify the decision processes, adjustments to governance mechanisms are made (Schneider 2002) influencing stakeholders' power. This consideration of this relationship has been presented in recent Acquisition literature, but not researched (Kotzian 2010; Wood 2010). One of the most influential works on bureaucracy (Wilson 1989) presents that the enabling tasks and the organizational structure must address the challenge of "autonomy" and "efficiency", defined very close to power and legitimacy. From organizational theory, relationship of the task environment and the organization structure provide the basis for the organizational behavior in the larger context of the operating environment (Thompson 1967). With the near convergence of the recurring insights, this finding is has a viable basis of support based on the respective frameworks definitions.

P2c: Product has important or very important influence on Stakeholder Salience attributes.

Product was found to have an important or very important influence on stakeholder salience in all three cases. This finding was not expected based on the initial literature review, however, based on the insights from organizational theory (Gulati and Kletter 2005; Lawrence and Lorsch 1967) this finding extends the premises presented. The logic follows (tying together the seeming unrelated propositions): based on the products architecture defined, the bureaucracy has established through differentiation, the task specificity needed; therefore based on the product architecture, the stakeholders are essentially determined from the aspect of legitimacy. However, the same research that provides this certainty also considers the need for integration (Lawrence and Lorsch 1967), which organization theory also shows that stakeholders will attempt to alter established salience levels by "enlarging the task environment" in which they operate (Thompson 1967). Summarizing across the cases, the product architecture energizes the stakeholders through their salience attributes, which then (as shown above) influence the value creation process. This cycle is closed based on the established literature of value creation's influence on enterprise architecture (Murman et al. 2002; Nightingale and Rhodes 2004), which then influence other enterprise architecture views (Rhodes et al. 2009).

P2d: Policy/External Factors and Strategy have low influence on Stakeholder
            Salience attributes.

The literature review discussed several studies that examined the macro-level of the defense acquisition industry with analysis of the transactional economics (Fox 1974; Gansler 1980). As a result of this type of analysis (Packard 1986), policies and laws with wide-spread implications were imposed (Goldwater Barry 1986). However, also presented in the literature review is the frustrated comments by senior leaders such as Secretary of Defense Gates (Gates 2009). This perspective is not merely anecdotal, but evident with continued research that identified the impotence of the policies and laws that have been enacted (Brady and Greenfield 2010). Systems analysis term this type of behavior as policy resistance (Sterman 2000) which is common when other dynamics are energized by system relationships.

While consideration from the systems perspective supports this finding, it would appear to conflict with the bureaucratic characteristics defined by Weber (Weber 1946).

However, in close examination the of the characteristics the last characteristic is particularly insightful, "…the management of the office follows general rules, which are more or less stable, more or less exhaustive, in which can be learned…"(Weber 1946) The two key terms from this characteristic is "*stable* rules" and "can be *learned.*" Resistance to organization change has already be identified as part of the behavior for bureaucracies (Thompson 1967). As previously discussed, the influence of architecture on enterprise engineering systems will facilitate the emergent behavior that contradicts intended design efforts (Whitney et al. 2004). This finding helps to illuminate the relationship between isolated architecture efforts and a well-espoused principle for organization change management requiring a holistic approach. (Kotter 1995; Senge 1990). This conclusion for bureaucracy even contradicts existing stakeholder theory (Jawahar and McLaughlin 2001) in that the expected dynamic lifecycle for organizations is not witness when the three cases are examined with respect to their status in the DOD lifecycle frame work. The preliminary stakeholder theory management perspective of the resistance to organizational change may provide researchers a dilemma and practitioners consternation.

However, the second view, strategy, as previously discussed, provides and opportunity for additional consideration. The theoretical basis for this is the consideration of the agent-theory (Eisenhardt 1989a) and the stewardship-theory(Davis et al. 1997). Strategy has the ability to define the primary objectives, which can leverage primarily extrinsic objectives such as agent-theory or intrinsic for subordination of self to the benefit of the organization such as stewardship. Based on this stewardship theory, the findings on the low influence of strategy for these cases may not be a generalizable proposition in a strategic architecture aligned to the bureaucracy characteristics.

P2e: Coercive (Power), Utilitarian (Power) and Pragmatic (Legitimacy) are importantly influenced by the current Enterprise Architecture

As this finding is persistent across the cases, most of the relevant literature has been discussed that supports the finding or provides alternative perspectives, a summary is provided. The salience attributes of power and legitimacy, while treated independently, are the basis for authority (Mitchell et al. 1997) supports by system relationships.

P2f: Moral (Legitimacy) is least influenced by the current Enterprise Architecture

This finding was persistent among the cases. As stated previously, the observations that assert the unimportant influence that Enterprise Architecture was deemed to have is supported both in literature and recent research. As presented earlier, the perspective afforded by stewardship theory supports the normative aspect of stakeholder theory. The common topic that is related to concept is the research that focuses on corporate social responsibility (Clarkson 1995). As clarified subsequent literature about the stakeholder salience attributes (Agle et al. 1999) and sub-attributes (Grossi 2003), this ideological parallelism is explicit. Other findings about this moral (legitimacy) present the implications for moral (legitimacy) influencing actions or value delivery (Eesley and Lenox 2006), but do not cite sources for the moral (legitimacy). Organizational theory tend to allocate rationale for the source of this moral (legitimacy) in the context of an individual's influence on the organization (Simon 1997). While this perspective would be commiserate with the organization architecture view (Rhodes et al. 2009), the analysis did not discern this influence relationship.

7.8 Closure

As one of the most cited works in the stakeholder theory literature, the Stakeholder Salience Model (Mitchell et al. 1997) provides practitioners and researchers a framework that addresses "who really matters" to a firm. Given the heightened awareness of the phenomena of firms moving toward increasing strategic alliances, partnerships, or extended enterprises (Dyer 2000; Gulati et al. 2000; Sheffi 2005), this research extends the framework perspective from one that is external to the firm to one that is convergent within the enterprise. The enterprise is the class of engineering system (Nightingale and Rhodes 2004) comprised of stakeholders (Ackoff 1981) that exists for a particular purpose (Ackoff et al. 2006). This purpose is to create value for its multiple stakeholders (Murman et al. 2002). The previous systemic view of the how multiple stakeholders interact with the enterprise was viewed through the lens of operational activity in the value chain (Porter 1985). A more holistic framework must be applied to perceive their relationships based on their position in the enterprise (Gulati et al. 2000) and influence in the dynamic realization of purpose – the value creation process. Based on the influence

relationships identified by the case study methods (Eisenhardt 1989b; Yin 2009), several propositions contribute to the field of enterprise engineering systems and stakeholder theory.

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8 Policy Implications

8.1 Relationship of Theoretical to Practical Approaches

Of the four perspectives to stakeholder theory presented in Chapter 2 (Fig. 2-8), the management perspective (Donaldson and Preston 1995) implicitly calls for theoretical contributions that bridge the gap into the practice of the field. While the debate of having to trade-off theoretical rigor and practical relevance continues, the goal appears to be "synthesis of rigor and relevance at a higher level." (Gulati 2007) To this end, the last task for the case study methodology is to provide policy implications. Based on the findings of the case study, this is somewhat ironic given the little influence that policy was identified to have on the value creation process. This chapter will examine the impacts of the landmark study recommendations and associated directives, legislation, and other forms of guidance that shape the DOD acquisition efforts.

8.2 Impact of Research and Studies for Acquisition

As indicated by Secretary of Defense Gates, there have been many studies of the Defense Acquisition effort (Gates 2009). While the number of "130 studies" indicates the prevalence of interest (especially given that a DOD study is a multi-million dollar effort), it captures only those research efforts that were sponsored within the DOD and is not exhaustive of all research efforts throughout the research community. With this situational awareness, the expectation to provide a closed-form solution for all of DOD acquisition would be "misdirected" (Sapolsky, Gholz et al. 2009). However, the following discussion attempts to facilitate the translation of the findings into new perspectives for the bureaucratic program enterprise.

8.3 Viewing Defense Acquisition Reform through a Dynamic Enterprise Engineering System Framework

8.3.1 Early DOD Reform Efforts

Efforts to reform defense acquisition operations is old as the nation, if one considers the story of the "breakdown of the American supply system" in 1778 linked to the Continental Army's first Quartermaster Major General Thomas Mifflin (Payson 1950). However, for this report, relevant studies of acquisition began with the formation of the Department of Defense (DOD) (Brown 2005). As the civilian control of the

military is either an elected official or a political appointee, there is constant flux. Each new leader does their best to improve the administration. Consequently, studies are persistently ongoing to "fix" acquisition, though only a few efforts were "successful" in being translating into law. This is deemed success in that either explicitly (by passing or signing the law) or implicitly (by not hearing the inevitable court case to overturn the act) all branches of the federal government approve the change.

Initially, efforts like the two Hoover commissions, 1949 and 1955, were principally focused on the establishment of the Department of Defense. During the 1950s, Congress did not use legislation to influence the DOD acquisition efforts based on a positive relationship with executive branch, primarily out of respect for the sitting president's executive experience. President Eisenhower was well known for his concern over the efforts of the Defense Services and the Defense Industry (Eisenhower 1961). However, with the 1960s, Secretary of Defense McNamara attempted to bring analytical rigor to achieve the business efficiencies to the department. This analytical effort infused a number of management science and operations research approaches to the value propositions of the department. This was accomplished with the shift in the distribution of the influence, from the service chiefs to the centralized analysts (Brown 2005). With all of the focus on the decision-making efforts, smaller adjustments occurred in the identification and delivery portions of the value creation process. These actions taken were not popular with the service leaders (Wilson 1989), the customary program metrics showed improvement (Brown 2005). Still, most of the changes to DOD acquisition occurred within the executive branch. However, with the increasing involvement in Vietnam, the rapidly increasing served to mask the inefficiencies that would surface later and belied the significant post-Vietnam defense spending cuts. With plummeting public support for the military and broad publicity for issues involving the U.S. Air Force's C-5 program, congressional leaders called for hearings over concerns of the apparent lack of oversight for acquisition. Defense acquisition had become political (Brown 2005).

8.3.2 DOD Internal Reform Efforts

A number of initiatives resulted inside the DOD by Deputy Secretary of Defense David Packard. The over-arching theme of the changes including the following themes:

- Help the services do a better job

- Have good Program managers with authority and responsibility

- Control cost by trade-offs

- Make the right decision right

- Fly before you buy

- Put more emphasis on hardware – limit paper studies

- Use the type of contract appropriate for the job

- Eliminate Total Package Procurement

These themes can be shown to target the value creation but only tangentially leverage the influence of the stakeholder salience attributes. The first two themes clarify the power distribution. The next two also focus on the methods used to support the value proposition. The "fly-before-you-buy" theme and "emphasize hardware" are a reaction to the C-5 issue but in general facilitate the delivery of value by encouraging prototyping and accelerated delivery. The last two themes target the value identification and the proposition aspects with identify the value exchanges and the mechanisms for these exchanges. What is not evident from this effort was the necessary architectural changes to realize the systemic adjustments in criticality and legitimacy. As a result, it would not be long until the next acquisition crisis.

Successive leaders in the DOD would adjust their policy levers when confronted with the next publicized program embarrassment, the Bradley Fighting Vehicle. With significant cost and performance challenges, the Army persisted supporting the central tenant of its future infantry force (Brown 2005). While this is not the last program to be identified as an example, the remaining studies seek to shape, stabilize, and reform the entire military-industrial complex. This program also served as the impetus for the Nunn-McCurdy Amendment, which established thresholds for program cost-overruns but also mandates a reporting requirement for the Secretary (either Defense or service secretary depending on the program acquisition category) to the Congress (1982).

8.3.3 Defense Acquisition Guided by Two Branches

The Cold War continued to escalate; the USSR invaded Afghanistan; Iran had taken American hostages in the American Embassy. The election of Reagan provided the political capital for a marked increase in defense capabilities. A report published by Dr. Gansler (1980) provided the following warning as the nation prepared for the build-up, "

the free market system is not operating to achieve economically efficient or strategically responsive behavior in the area frequently referred to as the military-industrial complex." To address these challenges, the report provided directions for further considerations. These directions focused at the macro-level with ideas such as significant government policy controls for the national resource of the defense industries. This re-alignment of oversight from weapon-systems to functions, e.g., engineering, manufacturing, etc. is much in line with the models of the value chain (Porter 1985) but at the national enterprise level. This approach would require significant legal adjustment to include the constitutional level. However, another study by Dr. Gansler reverses the call for strict government constraints and limitations to coordinate their actions, but remove policy-based "obstacles" and move to a consortium-based organizational structure for flexibility and agility (Gansler 1995).

In the middle of the Reagan administration's effort to dramatically increase the country's readiness, the government convened the Packard Commission to reassess the status of the acquisition efforts (Packard 1986). The commission recommendations continued the trend from Mr. Packard's previous guidance. The refinement of the link between planning and budgeting aligned with the national security strategy; the establishment of a direct linkage from the program manager to civilian oversight was clarified to relieve program managers from the levels of bureaucracy incumbent upon the existing chain-of-command; better requirements definition and cost-estimation, more operational testing and live-fire testing. While these initiatives seek to address the multitude of challenges, the following conveys the root-cause for the dilemma: "The truly costly problems are those of overcomplicated organization and rigid procedure..." Several more recommendations address other challenges evident in recent programs, but this comment is the central tenet of the issue (Goldwater and Nichols 1986). As a result of the commission's findings and immense interaction with the branches of government, success was achieved with the Goldwater-Nichols Act (Locher 2002).

The effects of this legislation were essentially a change in the power paradigm from the respective services (with DOD oversight) to the Chairman of the Joint Chiefs of Staff and the Combatant Commanders and shaped how resources and warfighting requirements

would be adjudicated. In the context of an enterprise framework, its purpose was to change the value creation process significantly.

There were significant architectural changes as processes and organizations co-developed (Murdock, Flournoy et al. 2004). The focus on developing joint product and service architectures, once a deliberate strategic view was established. It would appear that with this "victory on the Potomac," DOD should benefit and address the causes of acquisition's many issues. However, as evidence, the numerous GAO reports that continue to cite the services for their acquisition management failures as well as academic research illustrate that the Acquisition system has not only failed to improve but actually worsened the performance (Christensen, Searle et al. 1999).

In looking at the shortcomings of the effects of the legislation, policy analysis would looks at the levels of the significant factors and the results to conclude that the policies were not achieving the desired results. This analysis remains uninformed of the socio-technical aspects of the organization as a part of the system. As a result, decision makers lacked the rigorous analysis of these policies, strategies and other corresponding architecture views. Implicitly, leaders are aware of this as seen in the following exchange by Dr. Gansler in an interview with Andrew Butrica about the Goldwater-Nichols Act:

> GANSLER: I think it really did have a transforming effect which we are
> seeing today, probably only for the first time, the real impact of joint war-
> fighting and the benefits that can come from it, in Afghanistan. And we
> are now seeing technology that takes full advantage of that, so that you
> have an airplane tracking a mobile target and sending that data to an army-
> launched missile for real-time, in-flight retargeting. That's full jointness.
> BUTRICA: That is a technological miracle compared to where things
> were, say, ten years ago.
> GANSLER: But we could have done it ten years ago. That's the point I
> am making. It wasn't the technology that was limiting us. It was the
> organization, the tactics, the strategy, and primarily the culture. When we
> had AWACS years ago, the AWACS didn't have a link to a Patriot missile
> on the ground. It wasn't that we couldn't build a link. Technologically, we
> could easily build a link. Culturally, we couldn't build a link. Eventually,

of course, we did. Those were the sort of cultural barriers to taking

advantage of technology and the changes that were clearly possible.

(Butrica 2002)

This critical insight demonstrates that nearly twenty years after publishing his findings, Dr. Gansler understands the need to relate the aspects into a holistic approach such as that called for by the Enterprise Architecture Views. Earlier in the interview, Dr. Gansler acknowledged that the primary effect of the legislation was the re-prioritization of the requirements (value propositions), but that the inertial resistance was great in such a large organization as evidenced by the persistence of the "cultural barriers." From systems thinking, policy resistance is a common phenomena as an artifact of the dynamic complexity (Sterman 2000).

However, as senior leaders craft these architectural changes, the findings of this dissertation demonstrate that these changes will influence stakeholder salience and impact value creation. Such a "joint" approach has consistently been met with skepticism and considered to lack legitimacy. While this legislation explicitly addressed the pragmatic aspect of legitimacy, the moral and cognitive sub-attributes are not strongly influenced by the enterprise architectures, based on this dissertation's findings. These insights appear to provide a deeper understanding why the "long time" to address these organizational issues. Through persistent exposure through joint assignments and education in joint professional military education, the moral and cognitive sub-attributes for legitimacy appear to be increasing from the data analysis, with the caveat that the cases used were not in a joint program for comparison analysis. This is identified as an opportunity for future work.

In order to continue to address the cultural aspects in the organizations, the result was shifted to the individual level with the Defense Acquisition Workforce Improvement Act (DAWIA), initially enacted by PL 101-510 on November 5, 1990. Most of the Act was codified in 10 USC 1701-1764.

The intent of Congress was that DAWIA would improve the effectiveness of the personnel who manage and implement defense acquisition programs. While the Act applied to both civilian and military personnel, it emphasized the need to offer civilians greater opportunities for professional development and advancement. This would serve

to shift the responsibility for weapon system development from the predominantly uniformed officers to the government civilians based on the continuity afforded by the civilian workforce compared to the higher turnover rates of the military reassignments.

While Goldwater-Nichols Act emplaces the critical incentives by associating military promotions based on compliance with career paths with joint assignments and education. DAWIA served to help incentivize both military promotions by defining a career management with an Acquisition Corps proponency for military officers and outlining a career path for government civilians of increasing rank. This was deemed critical, as in most government civilian jobs there was little guidance on career path progression for professional education, training, or employment. Again, the results for the success of this effort are mixed. It has yielded a benefit; that is, increased perceived professionalism for both the military and civilian acquisition personnel. However, the significant effect has not been realized due to a disparity in the military opportunities to lead larger programs (Acquisition Category I and II) and lead responsibilities with civilian leadership occupying the deputy program manager roles predominantly (Garcia, Keyner et al. 1997).

This disparity is also reflected in the selection and attendance of senior professional education at the senior service college level without a noticeable change (Garcia, Keyner et al. 1997). While the Goldwater-Nichols Act was thought to enhance the level of professionalism of those current and future acquisition leaders, it has had little impact on the larger acquisition challenges. These results are surprising to many leaders. The Program Enterprise Stakeholder Salience Influence framework (Fig. 2-11) helps to provide insight into this counterintuitive result. The desire of senior leadership since the time of Secretary of Defense McNamara was to "have one person responsible and accountable" for the program (Fox 1974; Gansler 1980; Wilson 1989). As part of the candidate stakeholder assessments, the program managers were assessed as only having legitimacy and urgency based on their central role for interactions between government and industry stakeholders. When the data was extended to explore this emerging result, it was apparent that the decision-making process and symbolic power of other four-star command stakeholders limited the program manager to primarily be concerned with how to manage the delivery of value. To summarize, the legitimacy of the position, buttressed

with a high degree of professionalism, did not establish the envisioned role for the program manager, but only served to help them with some program management tools "to take the lemons thrown at them and to find a way to make it into lemon-aide" (Matty 2008).

8.3.4 Post-Cold-War Acquisition

The declaration of the end of the Cold War sent shockwaves around the world, which amplified in the newly forming vacuum of defense acquisition. After nearly fifty-years of intense development and reengineering, the defense acquisition system had lost its objective function. With a number of claims from latent stakeholders that demanded reallocation of the peace dividend, the defense leadership recognized the opportunity to stabilize the nation defensive posture with a deliberate effort to dramatically increase its efficiency both on the battlefield and in the institutional "back office" (Sullivan and Harper 1996).

With the lack of progress evident from the previous studies that had promised systemic solutions, Congress "increasingly involved itself in DOD affairs, demanding information, scrutinizing every budget request and passing ever more stringent regulations (Shiman 2005)." In response to the congressional pressures on the executive branch and DOD, the Defense Management Reform was initiated to improve defense acquisition and realize the objectives of the Packard Commission. Then-Secretary of Defense Richard Cheney, led the effort establishing powerful governance bodies and their associated extensive decision processes with the Defense Planning and Resources Board, the Defense Acquisition Board, reinforcing the role of the existing Joint Requirements Oversight Council (JROC) and creating the Defense Contract Management Agency (DCMA) (Shiman 2005). To impose better controls, the Defense Management Review revised the general guideline documents, the DOD 5000-series, expanding it nearly 15 times the previous length to 900 pages and coordinating with Congress to decrease recurring required reports. This decrease is a significant bureaucratic event as this decreased oversight increases the autonomy afforded to the DOD for acquisition.

Looking at the recommendations of the Defense Management Review, it is apparent that an initiative based on purely technical solution changing the enterprise architecture may not affect the endogenous relationships with stakeholder salience attributes that

influence the value creation. The increased power of the DOD-level boards not only compromised the pragmatic and utilitarian power of the services, but also mitigated the service legitimacy into the critical value identification process with the JROC. While the notion of integrating the service efforts to identify the necessary capabilities and programs to achieve these ends would serve to reduce redundant acquisition efforts this explicitly amplifies the challenge in a bureaucracy for autonomy. As with most reform initiatives, this effort for integration has a historical precedence. During the early phases of the "space race" that spanned from the launch of Sputnik in 1957 until the U.S. lunar landing in 1969, the then-young U.S. Air Force was considered responsible for leading the military charge to address this shortfall with the Navy in an unsettled back up position. After several failures, the focus shifted from the Air Force to the Navy who also struggled. After the success of Sputnik, the U.S. Army with its research efforts in rural northern Alabama, Huntsville, that provided the technological breakthrough that the U.S. needed to close the gap (Hadley 1986). Were it not for the failure of the leading services to force the Army to acquiesce and the persistence of Army leaders to continue to develop rocket science independently (with Dr. Von Braun), the outcome of the international battle may have very significant differences than the current result. The tension between cooperation and competition fuels the inter-service rivalry and provides ample feedback to the stakeholder salience influence for value creation.

The Defense Management Review's effort met an unexpected six-month pause with the invasion of Kuwait by Iraqi forces; the build-up of coalition forces for Operation Desert Shield, and the amazingly swift victory of Operation Desert Storm, which served as validation of the capabilities delivered by the much-maligned defense acquisition system. The battlefield victory on strengthened arguments for downsizing the military after the "Reagan Build-up" to realize the peace dividend; with the touted success of highly technical systems, the pending realization of a "revolution in military affairs" (Metz and Kievit 1995) strengthened the argument.

With the change of administrations in 1993, government reform was a top priority. However, while significant reductions in military spending were approved, the same defense strategy that provided the basis for the necessary capabilities remained essentially the same. Using the Process, Organization, and Product views to reaffirm the

current salience levels, the value propositions remained essentially the same. This reform effort appeared to be another round of "the more things change the more they stay the same."

The dynamics changed with the resignation of then-Secretary of Defense Les Aspin and the confirmation of his deputy, William Perry as the new secretary. Perry having been integral to the Packard Commission and a close observer of the Defense Military Reform efforts was committed to driving reform down-through hierarchy of DOD. With reform-focused offices established at the DOD and service levels, reforming was now everyone's job in DOD. While there was much discussion about the wisdom of removing the requirement for suppliers to meet military specifications, a potentially significant reform initiative was the requirement of Total Quality Management (TQM).

The significance of this initiative is not the quantitative benefits to fiscal efficiencies, although it was expected to help address significant challenges. The significance is that approach of implementing an new management approach supports one of the reform strategies that had been essential in previous acquisition programs such as the Polaris System (Sapolsky 1972). This type of reform strategy calls for the utilization of new or unfamiliar management science methods to help communicate progress to the numerous and diverse group of stakeholders (Sapolsky, Gholz et al. 2009). The Dynamic Enterprise Engineering System framework again provides insight as to why this strategy provides opportunities for success. The premise of the framework suggests that successful strategies will energize a virtuous cycle in the dynamics of the enterprise architecture – stakeholder salience – value creation. A sustainable continuous improvement initiative, such as TQM, inherently addresses the business model (strategy) through the process, organizational and knowledge architectures (Peters and Waterman 1982; Womack, Jones et al. 1991; Hammer 1996). These architectures facilitate the maturation of other architectures (Rhodes, Ross et al. 2009) for info/infrastructure (Ross, Weill et al. 2006), Product (Harry and Schroeder 2000) and Service (George 2003). As presented in this research, these reinforcing dynamics help with the delivery of value (Repenning and Sterman 2001), but as presented influence the value identification and value proposition as well. While all these systematic influences were present to sustain

this initiative, there was an important organization architecture aspect that balanced this dynamic.

The civilian work force holds the majority of the mid-level management positions (some politically appointed) associated with DOD institutional activities, and acquisition is essentially an institutional process. These civilian employees typically have business or engineering degrees. However, the military officers still hold nearly all critical leadership positions in the management structure below the Service Secretary with civilian deputies. The military professionals did not translate the TQM management methods into their leadership processes for the process architecture. This aspect of decision making is evident when one compares deliberate approach such as value based decision making (Keeney 1992) with the intuitive sense-making approach (Weick 1995). This dichotomy in approach can hamper future reform initiatives. If one of the two management methods is not sustained, those who were initially supportive can quickly become reluctant to support future efforts; conversely, those who resisted the change are emboldened in their stasis (Repenning, Sterman et al. 2002).

The reform efforts seemed to have all the prerequisite factors needed for a successful change effort (Kotter 1995). However, by the late nineties, DOD acquisition reform and programs had not only stagnated, but conditions were set for a "death spiral" (1998) with existing systems extending their lifecycles due to an ever-growing list of replacement programs that were severely over budget and behind schedule. Leveraging this situation as an opportunity, the Army Chief of Staff Eric Shinseki initiated the Future Combat System program (see Chapter 1).

8.3.5 A Government at War

The following administration had great expectations for advancing defense reform. For the first time in its history, the incoming secretary of defense had held the position under a previous administration. Secretary Donald Rumsfeld, who had previously served as the youngest executive as the Secretary of Defense, returned to this position with years of political and industrial experience. With another former secretary of defense, Vice-President Cheney, to facilitate coordination with the senate, the DOD was poised for acceleration in reform. The strategic context arguably changed in three hours on September 11, 2001. With the terrorist attacks redefining war for most citizens of the

United States, the Combatant Commanders now exercised active combat responsibilities as part of the Global War on Terror.

Most of the country and much the world viewed the surreal images of the attacks. The response to reestablish a defensible global order, the U.S. made retaliatory strikes in Afghanistan. Soon after, the efforts expanded into Iraq. While the DOD and other agencies rushed to engage with the enemy, the country was urged to return to its usual activities to deny the terrorist's desired effect of changing the American's way of life.

The early engagements in Afghanistan and the initial conflict in Iraq first seemed an encore of the early 1990s display of U.S. military capabilities, yet the antagonists rapidly adapted their techniques to pose asymmetric threats. These subtle tactical changes had operational and strategic impact on the material solutions provided to the combatant commanders. The struggle changed rapidly from a battle of maneuver to a deadly competition of innovation and adaptability.

As the intensity of the these exchanges and graphic images of the results increased, so did the pressure of public opinion and political leaders on the DOD to provide the necessary support to the Combatant Commanders and service members in harm's way. Several highly publicized disagreements among the leadership in the DOD, Executive Agencies and Federal Government resulted in the public attribution for the state of activities on Secretary Rumsfeld. One of the significant points of contention was the approach by the Secretary to use the ongoing conflict as the motivation to initiate the transformation that was expected upon his entering the Office. Some questioned the validity of changing the way DOD operated to meet the needs of the deployed service members, while others saw the transformation as a disguised attempt at re-branding "failed" reform initiatives. Nonetheless, using the Combatant Commanders as the impetus for change provided the 'real-world' situation for adjusting the value proposition as directed by the Goldwater-Nichols Act. This shift highlighted numerous architectural flaws with the process, organization, and products.

The process architectures demonstrate the lack of flexibility needed to aligning the uncertain real-time requirements with the predictable annual-cycle defense management methods. The organization architecture highlighted the lack of adaptability, the lack of the necessary emergent behaviors, and the absence of skill sets to manage the dynamic

task environment were straining the defense enterprises. The product architecture exacerbated the system's struggles to achieve and sustain the necessary performance; the rigid product set provided little or no help build the current capability set needed and to avoid sacrificing the carefully designed, robust suite of advanced systems for the next-generation battlefield.

Implicitly, those stakeholders that could fortify the existing architectures to sustain their salience attributes. As demonstrated, by maintaining their salience attributes, they could influence the value creation process and sustain the critical aspects of the enterprise architecture. This type of system behavior predictable, as stated by Herbert Simon:

> The individual who is loyal to the objectives of the organization will resist modification of those objectives…the individual loyal to the organization will support opportunistic changes in its objective that are calculated to promote its survival and growth. (Simon 1997)

Government service, whether military or civilian, is based on the intrinsic benefits – principally one's sense of duty (Light 2008). As demonstrated, the influence of enterprise architecture has unimportant influence on a stakeholder's moral legitimacy. Consequently, it will not be apparent that alternative architectures allow for continued moral fulfillment.

Following the Rumsfeld's resignation as Secretary of Defense, he was replaced by Secretary Gates. Secretary Gates' resume also boasts previous experience as the lead for a Federal Agency, the Central Intelligence Agency. The change afforded a strategic pause that resulted in a change in strategy by increasing the presence of forces in Iraq to suppress and stabilize large areas. As conditions appeared to improve in Iraq, a new administration entered the Presidency. In a nontraditional sequence of events, Secretary Gates remained in his politically appointed position. However, it was clear that the executive branch would reexamine current acquisition programs to validate the value propositions (Gates 2009). Secretary Gates' findings prompted the comments (see Chapter 1) that serve as the motivation for this research effort. Policy guidance has since been issued that realigns several decision points along the lifecycle management framework (see Chapter 2).

One observation of future reform efforts may be evident in the handling of the Mine Resistant Ambush Protected (MRAP) vehicle. Due to dramatic increase in the effectiveness of insurgent terrorists attacks with deploying improvised mines to attack mounted vehicle traffic, Congressional leaders and Defense officials circumvented typical government process timelines and rapidly fielded a fleet of the MRAP's to the deployed forces. While the vehicle is not impervious to mine attacks, it afforded greater survivability, which meant larger mines were needed to inflict damage to the MRAP, in turn driving the insurgents to seek other countermeasures. This fielding occurred roughly within one calendar year. This is a significant achievement, in that while the timelines were circumvented, the necessary (and legal) process steps were performed and provided significant operational effects. While this observation is touted as a success, many institutional leaders view this as a one-time exception rather than a model to emulate. (Matty 2008)

Wartime funding for the services may had helped to arrest what Kotter in 1998 called the "death spiral" of DOD acquisition reform. Yet a decade later, it was unclear whether growing budget concerns and the companion political pressures linked to the national debt might set the spiral back in motion.

8.3.6 Current Reform Efforts

As discussed in Chapter 1, Secretary Gates announced several program cancellations. This alone is not reform, but following up on administrative campaign promises, the Executive and Legislative Branches enacted the Weapon Systems Acquisition Reform Act of 2009 (WSARA) (2009). The act essentially carries through the reform themes initiated in the early 1970s by Mr. Packard, with targeted measures to address persistent painful issues.

The WSARA's first measure was to direct the Joint Requirements Oversight Council to seek input from the Combatant Commanders. The law also increases the requirements for DOD to provide reports to Congress. Moreover, it and strengthens the Nunn-McCurdy Act's consequences to programs that have a significant cost overrun with a presumption of cancellation without pro-active Secretary-level actions to request continuation from Congress.

Other major policies continue to strengthen the centralized control of DOD over the services. For example, a new cost analysis directorate has been created, allowing the existing Program Analysis and Evaluation Directorate to focus on program evaluation. In this context, the term *program* includes acquisition programs as well as other efforts such as training programs, organization structures, and so on. WSARA also mandates enhancing the technical acquisition process by adding a director for Life Fire Testing and Director for Systems Engineering for assessing program plans. The act also requires competitive prototyping, developing alternative models, unless an exception for the benefit of the nation is approved. Moreover, the act provides new guidance on the milestone decisions that control the progress of the program in the Lifecycle Framework. All of these initiatives reinforce the general themes that have guided DOD acquisition reform for the last sixty years. These themes are the following:

- Greater oversight and management control of acquisition processes by political officials (elected and or appointed) by creating positions charged with accountability and responsibility
- More rigorous system engineering and management methods to ensure successful system development and eliminate cost overruns
- Re-balancing the influence of Combatant Commanders, actively engaged in current operations, with the services long-term institutional view

In applying the Program Enterprise Stakeholder Salience Influence Framework to previous similar actions, it was evident that the approaches used to achieve these objectives attempted to directly alter the value creation process without consideration of stakeholder salience and the influence of the enterprise architecture. Using the framework to analyze the new set of policies, the following dynamic hypotheses are formulated.

The first one considered is the intensified punitive actions as a result of a Nunn-McCurdy breach. As was evident with Case 2, the consequence of the cost over-run was the program was canceled. The stakeholders were aware of this possible consequence very early in the effort; however, the breach reported until the last possible opportunity prior to the milestone decision. This reporting was based on the same established Earned-Value Management (EVM) metrics called for in this new legislation. Based on

investigation results there were no lawsuits or criminal prosecutions so there were not any negligent or illegal issues. From a policy standpoint, it does not appear that this portion of the law will independently prevent programs from breaching the Nunn-McCurdy threshold.

The next set of mandates does provide architecture modifications by establishing several new directorate-level organizations. The definition of roles and responsibilities for existing and newly created organizations has significant impact on the task environment. However, at this level of policy, it is unclear how these changes will integrate the requisite modifications for differentiation and integration for the process, organization, and knowledge views. To demonstrate how these changes will dramatically influence the stakeholder salience, we can examine one of the specific tasks assigned to the newly formed Directorate of Cost Assessment and Program Evaluation (DCAPE). The DCAPE is responsible to provide guidance for the Analysis of Alternatives for all programs for which the JROC has validation authority. This again is a shift from the initiating Service that seeks to address a capability gap; not only in how the analysis is conducted but also in how input is received from the Combatant Commanders. Based on the research presented, this will have an important influence on the legitimacy for the services, as well as the on power of the Combatant Commanders. This effect on the Combatant Commanders, coupled with their high-levels of Urgency due to their ongoing missions, provides them increased salience, which meets the intent of existing policies. DOD now has entities that dominate all three of the salience attributes while the services have significantly lost salience. This has important ramifications on the value creation process. While this assessment does not pre-judge the impact of this legislation, historically, when DOD overpowers the services, Congress utilizes its constitutional mandate to allow direct interaction with the Services for value identification. If there are sympathetic, influential policymakers on the respective appropriation committees, the value proposition can be reflective when they determine the budget resource allocation (Wilson 1989; Sapolsky, Gholz et al. 2009). This demonstrates the flow of changes in the Enterprise Architecture, the relationships to the Stakeholder Salience, and the possible result in the value creation process. While many refer to this as the politics of

Defense Acquisition, this research provides the framework where this behavior emerges based on the influence of the complex system frameworks.

While the law has been reviewed and appropriate directives have been provided, the dynamics of these changes are just now being implanted system wide due to the annual cyclical nature of many of the processes and organizational interactions. A more thorough analysis of the implementation using the framework is warranted and would prove valuable from a longitudinal perspective given the results of similar approaches used in the past.

8.4 Policy Implications for the Bureaucratic Program Enterprise

The review of Acquisition Reform using a Dynamic Enterprise Engineering System Framework is insightful to understand that interactions at the national enterprise level. This effort can also help understand those policy implications at the program level. To ensure the full context is apparent, the Program Executive Offices are analogous to the multi-program enterprise level (Murman, Allen et al. 2002).

The initial motivation for this research effort was to understand the contribution to a program probability of success based on the programs advocacy and the interaction with the program enterprise. Based on the preceding discussion of reforms the level of salience for a stakeholder is not only important to influence the value creation process, but has important influence relationships based on the Enterprise Architecture. One of the important insights from the review of Defense Acquisition Approaches (Chapter 2) is uniformity of applying same system engineering process across all program enterprises. As shown in this research, a stakeholder's salience will influence the value creation process. From a management perspective, a Dynamic Enterprise Engineering System Framework provides the enterprise an understanding of how a candidate stakeholder influences the value creation framework and extends this to descriptive perspective, by demonstrating how the enterprise architecture influences salience in the bureaucratic program enterprise.

The acquisition enterprise has an established group to facilitate coordination called the Integrated Product Team (IPT). This existing governance body provides the opportunity to immediately impact and to directly correct this management deficiency. This body would be the appropriate group to conduct an explicit review of the

stakeholder salience assessment. Based on this type of assessment, each candidate stakeholder could be provided feedback on their ability to influence the value creation process in accordance with their respective program role. This type of instrumental perspective would be beneficial for the individual candidate stakeholder as well as stakeholders that serve in a facilitating role such the Chair of the IPT. Previous research efforts clearly identify significant gaps can exist between a self-assessed salience attribute levels and the enterprise stakeholder salience assessments for the respective candidate stakeholder (Matty, Blackburn et al. 2008).

This research also provides clear insights for addressing stakeholder salience issues based on the influences of the enterprise architectures. This prescriptive approach presumes the ability to modify the enterprise architecture. The findings within and across the cases suggest that the most influential enterprise architecture views for stakeholder salience are process, organization and product. While the fields of study that address these views independently are well established, an overarching field integrating these views is still emerging (Nightingale and Rhodes 2004). However, there are insights that facilitate this instrumental approach. Simon asserts that commitment to an organization will facilitate adaptation (Simon 1997). Wilson appears to contradict this assertion in that a bureaucracy will struggle to address a problem of efficiency while the organization is concerned with its autonomy, which is essentially the ability to exist (Wilson 1989). Lawrence and Lorsch provide the clarity needed with their rich discussion of differentiation and integration, where the enterprise architecture can reaffirm the differentiating capabilities of the stakeholders reinforcing their legitimacy, and asserting power within the governance mechanisms to integrate the enterprise delivery. The findings of research presented found little deviation of the stakeholder salience assessments across the cases, even though current stakeholder theory proposes that stakeholders should attenuate as a result of the (enterprise) organization lifecycle (Jawahar and McLaughlin 2001). An example of the ability to influence this at a level commiserate with the program enterprise is the chairmanship of the IPT. There are other decisions that determine key implementation decisions for the program enterprise in developing the products that are required at the enabling and leadership levels of the

process architecture that can vary across programs to best influence the dynamic influence relationships presented.

8.5 Conclusion

Using a Dynamic Enterprise Engineering System Framework provides the researcher and practitioner insights to understand enterprise system behaviors in a rich sense based on the architectural influences on stakeholder salience and how these shape the value creation process. This framework can be applied at multiple levels of enterprise to provide dynamic hypotheses for policy analysis. These dynamic hypotheses are often counter-intuitive due to the dynamic complexity that is addressed by the relationships of the endogenous treatment of variables that are often treated as exogenous if not excluded.

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9 Summary/Future Work/Conclusion

9.1 Summary

Review of relevant literature for this study, notably recent published reviews of stakeholder theory (Friedman and Miles 2006; Laplume et al. 2008), supports the premise that stakeholder theory has developed into intermediate level of theory (Edmondson 2007) with specific but diverse perspectives (Laplume et al. 2008). However, this specificity has achieved at the expense of a cohesive over-arching theory (Donaldson and Preston 1995). A provisional theory such as a Dynamic Enterprise Engineering Systems framework can help reintegrate these complementary perspectives, both by leveraging well-established frameworks that allow stakeholders to be identified and categorized (Achterkamp and Vos 2007; Agle et al. 1999; Mitchell et al. 1997), and using system analysis to yield for enterprise value (Murman et al. 2002; Nightingale 2002) provides this holistic contribution.

The illustration of a Dynamic Enterprise Engineering Systems framework demonstrates the change in the mental model using a closed-loop system:
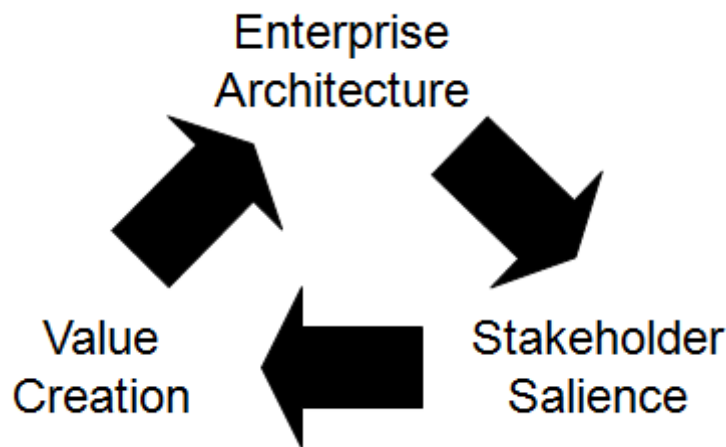
Figure 9-1 Dynamic Enterprise Engineering System Framework

Through analysis of the literature of multiple disciplines (Chapter 2), this study has sought to integrate relevant concepts across those disciplines, to identify theoretical consistencies, and to close theoretical gaps, notably across the engineering, management, and social science disciplines. Based on this literature review, stakeholder theory was selected as the theoretical construct that provides the logical system-relationships between enterprise architecture and value creation and still allows for dynamic complexity.

Adapting two widely accepted case study methods (Eisenhardt 1989; Yin 2009), the Stakeholder Salience Index assessment (Grossi 2003), and interview methods to extend qualitative data collection efforts (Charmaz 2006; Glaser and Strauss 1967; Weiss 1994), provided a protocol that addressed construct validity, internal validity, external validity,

and reliability. Using case study methodology, three cases were selected based on the logic of replication. Hybrid methods (Chapter 3) were used to triangulate the rich set of data collected (Jick 1979) in a manner that was repeatable and reproducible and also allowed non-parametric statistics methods (Conover 1999) to be applied to the resultant ordinal data.

Using the research question "How does stakeholder salience influence value creation in a bureaucratic program enterprise?" two initial propositions were posed:

Proposition 1: The stakeholder salience attributes influence the enterprise program value creation process.

Proposition 2: The program enterprise architecture influence stakeholder salience attributes.

Using the adapted iterative case study methodology described in Chapter 3 these propositions were refined and focused based on the presence of strong evidence for each of three cases studies (Chapters 4-6) and then refined based on a cross-case analysis (Chapter 7). The resultant propositions in the context of a bureaucratic enterprise such as a defense service agency are:

P1a: The stakeholder salience legitimacy influences the enterprise program value identification process.

P1b: The stakeholder salience power influences the enterprise program value proposition process.

P1c. The stakeholder salience urgency influences the enterprise program value delivery process.

P2a-c: Process, Organization, Product have important or very important influence on Stakeholder Salience attributes.

P2d: Policy/External Factors and Strategy have low influence on Stakeholder Salience attributes.

P2e: Coercive (Power), Utilitarian (Power) and Pragmatic (Legitimacy) are importantly influenced by the current Enterprise Architecture.

P2f: Moral (Legitimacy) is least influenced by the current Enterprise Architecture.

Based on these new propositions, the significant policy initiatives were reviewed using a Dynamic Enterprise Engineering Framework. Despite the influence of policy on value creation for the enterprise and its stakeholders (P2f), a review of defense agency policy initiatives (Chapter 8) pointed up the practical hindrances to driving and sustaining value creation in the defense acquisition system, and how reform resistance can stymie policy aimed at reversing the system's degrading performance and breaking what has been called a "death spiral" in the system (1998). Further, current efforts and several methods are alternatives for modifying the program enterprise architecture were presented (Chapter 8.4) that could dynamically influence stakeholder salience and the

value creation process to provide reinforcing systemic behavior within the existing management hierarchy of the defense acquisition system.

9.2 Future Work

While the Dynamic Enterprise Engineering Systems framework has both theoretical and practical potential to close significant gaps in stakeholder, the Army's senior leadership, when briefed on the emergent findings, asked the expected question: "How will this help us provide the necessary capabilities to the war fighter?" This section will address this request as well as identify several other research opportunities that were outside the scope of the current research effort.

9.2.1 Testing the Propositions Across Program Enterprise Factors

Using the case study methodology, replication logic guided the selection of the cases. As discussed in Chapter 3, the effect of this logic was to identify cases as similar as possible. While the results presented have high construct validity, based upon the approach of having key informants' review of the draft case study report (Yin 2009), when testing theoretical constructs, it is desirable gain insights as to whether the theory is a process-based construct or a variability-based construct. Using the case study replication logic, the constructs provided are intended to be process-based; however, the notion of robustness is desirable from an applied research perspective. Based on this opportunity, the repeatable and reproducible aspects of this research protocol, this effort is feasible. Additionally, with respect to the third case, not only is the program enterprise very early in its lifecycle, but it is on an accelerated schedule, which would make it a strong candidate for a longitudinal case study.

Both of these opportunities would serve to strengthen or refine the constructs presented. Specifically, future efforts could include research to:

- Test the generalizability of this study's theoretical constructs across different programs
- Develop a self-administered Enterprise Architecture assessment for Enterprise Architecture Views
- Refine the Stakeholder Salience Index assessment to incorporate Enterprise Architecture Influence
- Investigate Stakeholder Salience Alignment on Enterprise Value Creation

9.2.2 Stakeholder Alignment

During previous efforts to develop a description of an enterprise architecture for the current state and a proposed future state (Matty et al. 2008), a question arose that was similar to the Army senior leaders' question: "What are the management decisions that are appropriate to enhance a multi-program enterprise's ability to deliver value in a dynamic and uncertain environment?" Without the insights of a Dynamic Enterprise Engineering System framework, past decisions to alter the enterprise architecture have occurred without sufficient understanding of either (a) the influences that Stakeholder Salience has on the value creation process, or (b) the impetus of the policy resistance

and dynamic complexity that Enterprise Architecture views have through a series of influence relationships on value creation. Building upon the findings from the propositions, comparative analysis of the stakeholders' salience and their influence on the value creation process would enhance the instrumental perspective of this stakeholder theory. The analysis results could be used within the framework of relationships identified between the enterprise architecture views and the stakeholder salience attributes leveraging the framework to develop generalized models and methods for characterizing, designing, and evaluating enterprise architectures (Rhodes et al. 2009).

9.3 Conclusion

In 1989, the Cold War ended with the rapid disintegration of the USSR. The depleted Soviet military could no longer suppress the dynamic social forces because of the hemorrhaging of resources during the Afghanistan War. This defeat was a result of two separate campaigns. One was the ground campaign in central Asia. The other, played out in research laboratories and manufacturing facilities, was the campaign to compete in the weapons race with the United States. Their inability to conduct combat operations while sustaining the weapons acquisition lifecycle bankrupted the country and resulted in their defeat. This lesson in political science and technology policy is alarming given the status of the United States' commitments and global operations.

It is apparent from the actions by the United States government that the increasing acquisition system failures are a strategic concern for both national and international security (Hoffman 2009). In spite of nearly forty years of incrementally forcing business efficiencies and more rigorous engineering management methods in policy to reengineer the system, the trend of increasing program enterprise failures have not reversed (GAO 2009). This overt demonstration of policy resistance (Sterman 2000) in a large-scale, complex system typifies the needs for an emerging field, founded in multiple disciplines, such as engineering systems (Moses 2004).

This research presented sets the stage for advancing a provisional theory such as the Dynamic Enterprise Engineering Systems framework to address the theoretical gap from a multidiscipline perspective; however, the contributions presented offer applied research opportunities that could support efforts to address the systemic challenges for the DOD acquisition. Based on historical precedence, the development of approaches and solutions to address these challenges is highly beneficial. Failure to do so will have significant strategic implications at the national and international level.

9.4 References

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