Social Cognition Within Complex Systems: A Descriptive Case Study of How Product Support Managers Experience Public-Sector Defense Acquisition Environments

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Dedication

I dedicate this work foremost to Kimberly and our son, Oliver. You are my dream come true, and I learn from you the value of love, play, and laughter every day. I also dedicate this work to the product support managers who have motivated me to do my best in this and discovering the possibilities of our profession. Lastly, I dedicate this to my mom, who could not be with me to see this achievement but certainly provided everything I needed to succeed at anything and get back on my feet after failure.

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I cannot find enough words of thanks for the product support managers who participated in the study. They were more than generous with their time, often sharing experiences well into the evening. Thank you for being open and honest, entrusting me with your stories, and letting me continue to work with you over the years on more

challenges. I was lucky to get to know each of you and understand the sacrifices you make daily in pursuing a profession that exists to support others.

Abstract of the Dissertation

Social Cognition Within Complex Systems:
A Descriptive Case Study of How Product Support Managers
Experience Public-Sector Defense Acquisition Environments

This qualitative, descriptive case study explored the social learning process within complex systems as described by product support managers (PSMs) assigned to acquisition programs within the Naval Air Systems Command. The research questions asked how individuals, as influenced by their values and structure, shape their interactions and behavior in a complex environment. Nine PSMs for major acquisition and sustainment programs were referred by senior leaders and participated in the study.

Data were collected through in-depth interviews that were transcribed to capture the PSMs' experiences and then synthesized into contextual and social learning profiles. The findings resulted in seven themes. (1) PSMs operate in complex, dynamic, and variably resourced environments that are highly dependent on interaction and result in uniquely executed programs. (2) The highly structured environment and functionally oriented structure diminish the authority of the individual and present barriers to interaction. (3) The highly structured and boundary-rich environment limits information flow and presents difficulty in communication and developing routines that align meanings, value orientations, and shared understanding across those boundaries. (4) PSMs attempt to adjust, increase, and routinize interactions but often react to emerging needs with limited authority and resources, which often leaves short-term and least helpful alternatives. (5) PSMs leverage key relationships as bridges of information but often receive limited feedback to resolve short-term issues to complete tasks. (6) PSMs are aligned with organizational goals and values to improve user outcomes and speed of

delivering products, but there is value incongruency between expectations and what they want to do to achieve those outcomes. (7) PSMs experience role ambiguity, as they are torn between how much they want to develop the team and interactions versus becoming an expert and accomplishing tasks.

The study concluded that PSMs are effectively *leveraging different operating system* views to maximize the variety of the small alternatives they have; *countering the power of the system* through meaning making, developing their unique abilities (as well as their team's) and trying to reduce their isolation; and *increasing the available space for social learning* to make progress through trial and error and satisficing.

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CHAPTER 1:

INTRODUCTION

Overview

Defense aerospace products and their associated support systems appear to be consistently unreliable and costly, with suboptimal performance outcomes well publicized in professional literature (Charette, 2008; Eaglen, 2012; Gray, Kimmel, & Tangredi, 2010) and numerous General Accounting Office/Government Accountability Office (GAO) reports (GAO, 1981, 2003, 2004, 2005, 2006, 2007, 2008, 2009a, 2010, 2011, 2017). These issues are global and not unique to U.S. Department of Defense (DoD) acquisitions (Gray, 2009; Perrett & Wall, 2011). While poor acquisition performance receives much of the attention, a larger problem emerges when considering that the acquisition and production phases of a program represent approximately 30% to 40% of total costs, while operation and sustainment represent approximately 60% to 70% (Barrett, 1989; Rendon & Snider, 2008). These "sustainment-dominated systems" (Sandborn, Herald, Houston, & Singh, 2003) include public-sector aerospace and defense systems and are increasingly associated with performance-based logistics strategies to achieve optimal outcomes within highly complex systems (Randall et al., 2015). Evidence suggests that the majority of a system's or product's costs are expended later in the life cycle in operation and sustainment of that system or product (DoD, 2016; GAO, 2009b), yet the most opportune time to influence those costs is very early in the development (Blanchard, 2004, p. 25; DoD, 2013, p. 3.1.2; Rendon & Snider, 2008), where the complex system and its dynamic use and environments are likely the least understood and based on only a conceptual design in many cases.

Cost increases, schedule delays, and poor performance in defense acquisitions have been attributed to increasing system complexity and change (Charette, 2008; Hamner, 2010) as well as significant organizational and policy structure (Herman, 2012). Additionally, there is a lack of individuals with the requisite skills, education, and experience (Charette, 2008; Church, 2010) and understanding of system interactions and dynamics (Warwick & Norris, 2010). This has resulted in recent calls to action to reduce spending while increasing the number of personnel with a life-cycle, long-term focus rather than near-term and narrow lens (Carter, 2010). Further, DoD has expressed an increased need for thinking about how to adapt structure (Kendall, 2012, 2015) as complex programs evolve as well as critical thinking in developing long-term sustainment strategies (DoD, 2013; Kendall, 2011) in order to field more effective and affordable weapons and support systems.

Organizational structure within DoD acquisition programs typically spans from the department through an individual service's or component's acquisition executive, then a Program Executive Office (PEO) responsible for a portfolio of programs, to an actual program office that includes a program manager, as depicted in Figure 1.1. There are typically one or more PEOs within a service or component and multiple program offices within each PEO. Additionally, more than one acquisition program may be managed by a single program manager and supported by a single product support manager (PSM) assigned to a program office.

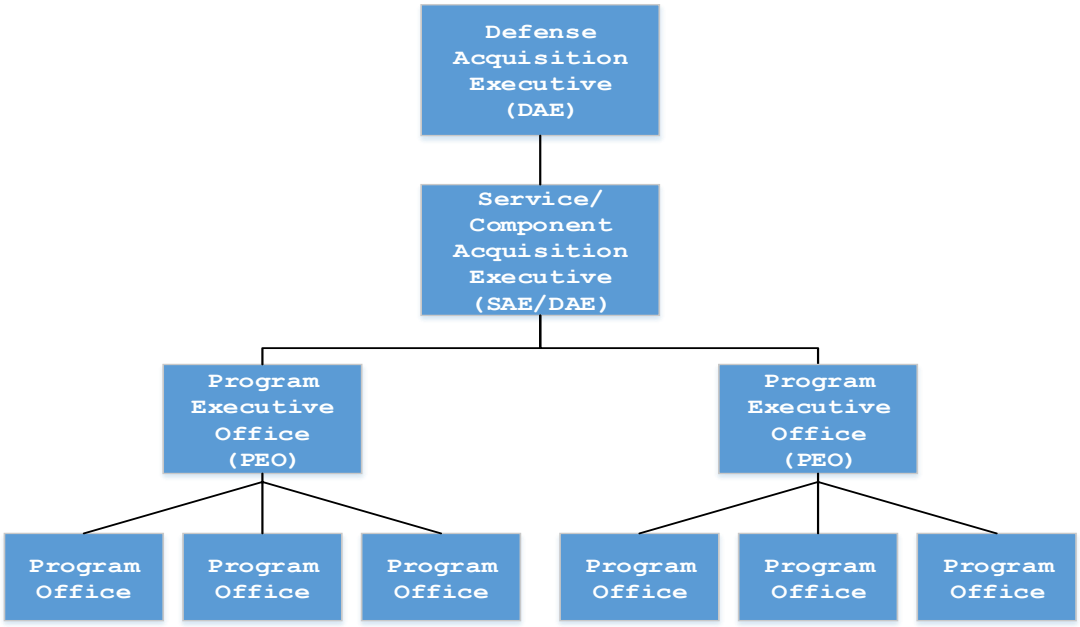

Figure 1.1. Basic Department of Defense acquisition organizational structure.

PSMs are at a crucial nexus between acquisition and sustainment, charged with influencing design for maintainability and supportability in the conceptual and design stages of an acquisition while concurrently developing the integrated product support system to effectively sustain operations well into the future (DoD, 2016). A typical naval acquisition program office is often organized around product structure or functional responsibilities or both, as shown in Figure 1.2.

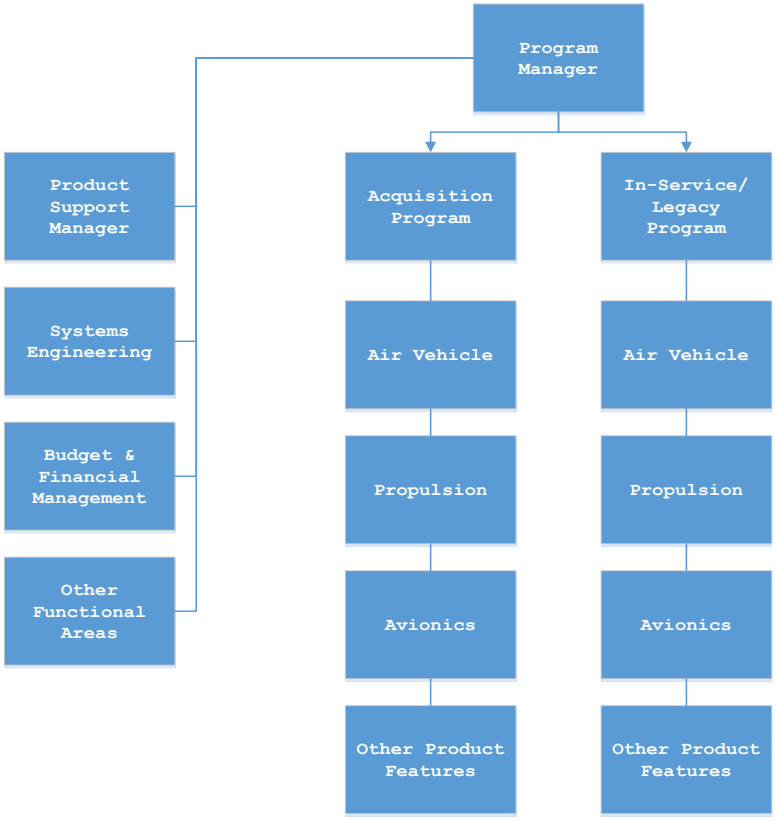

Figure 1.2. Typical program office organizational structure.

While there is a need for PSMs to be "experts in all aspects of product support with the right mix of experience, leadership, training, and education" (Peters, 2015), as well as communication and relationship skills (Kobren & Killey, 2012), the requirement for assignment of PSMs is primarily based on a product's acquisition category (National Defense Authorization Act, 2013), while an individual's level of ability to comprehend complex systems, processes, and content remains largely undefined. A product's acquisition category level is determined primarily by the amount of money associated with developing and producing it and does not include the amount estimated to operate and sustain it (where most of the product's money is spent) (Kendall, 2015). A PSM's duties are clearly defined in acquisition workforce position category descriptions yet lack

clear connections to an individual's abilities, as the role remains largely associated with grade/seniority and criticality of the position to established acquisition processes (Peters, 2015). The PSM's responsibilities, as proscribed by U.S. Code Title 10, Section 2337 as of July 2016, are included in Appendix G.

Based on that list of responsibilities, it becomes clearer what their responsibility is in ensuring integrated product support, which consists of 12 "elements or functional components that make up the required product support infrastructure" (DoD, 2011, p. 27). A PSM must understand and integrate these components during all phases of a product's life cycle. While there may be weak associations between cost and complexity as well as roles, abilities, and potentially positive outcomes (Kobren, 2010), there is little in-depth evidence of how an individual's abilities contribute to understanding and acting within a complex and highly integrated system.

This integrative work required of PSMs necessitates that these individuals interact with, coordinate, and apply numerous disciplines and functions in a complex acquisition system during planning, development, and operations (Kobren, 2013). This collaboration and shared understanding of logistics across disciplines is recognized as crucial to influencing long-term sustainment outcomes but remains difficult in practice to affect and assess against desired outcomes (GAO, 2017). While trait and ability descriptions and requirements tend to remain technical and process oriented (Kobren, 2014), understanding and effective functioning within the system by an individual may require selective application of systems thinking, critical thinking, or strategic thinking at unique intersections and understanding of "cooperative discourse" (Webler, Kastenholz, & Renn, 1995, p. 447) attributes when engaging with other individuals, groups or functions, and

the environment. Individuals then respond or act within the environment utilizing individual cognitive frames, or individual schemas that "serve as guides to interpretation" (Kaplan, 2008) that can be used or 'applied' during design reviews, product support planning meetings, and other decision-making processes. Further, the cognitive frames that "shape how actors recognize what is going on" (Kaplan, 2008) and result in an orientation for learning within the system and then acting in complex contexts may be influenced by an individual's values, such as those expressed by Schwartz and Bilsky (1987), Feather (1995), and Hitlin and Piliavin (2004), as well as structure. The process requires both cognitive and social interaction.

Social systems presume structure that consists of rules and resources (Giddens, 1993). Organizational structure and cultural contexts often provide system-level boundaries that might influence behavior toward achievement of system-level goals and, in effect, create "industry recipes" (Spender, 1989) or functional specialty stove-pipes that may not be conducive to integrated or systemic planning and decision making. Structuration, a term coined by Giddens, represents both the medium and the outcome of the actions of agents within a system (Stones, 2005). How a PSM experiences structure within a complex system would then seem to play a very influential role in how a PSM comprehends and responds to emerging events associated with the acquisition process.

Statement of the Problem

The problem addressed by this study is the minimal evidence-in-depth that exists for understanding how a PSM experiences a complex acquisition system, particularly in acquisition logistics contexts, with significant social and structural influences. As Sterman (1994) stated, "Learning about complex systems when you also live in them is

difficult and rare, often due to structural impediments that thwart learning" (p. 292). The need to understand systems and new forms of practice in complex defense systems is recognized, and it often calls for the "right" skills, human factors, and behavior (Oxenham, 2010) as well as better understanding of dynamic behavior with interactions (Warwick & Norris, 2010). "Social theories of learning and systems thinking are complementary" (Cundill, Cumming, Biggs, & Fabricius, 2012): social theories of learning can aid understanding of how "norms, values and constructions of reality meet in an environment that is conducive to meaningful interaction" (Wals, 2007, p. 39), while systems thinking can help frame an individual's way of "seeing connections and interrelationships to fine tune (via social learning) functions, roles" (Wals, 2007, p. 37) and sensitivities to achieve a desired outcome. This study sought to provide insight into how PSMs experience systems thinking frameworks (e.g., interpretive, functional, and structural; Jackson, 2009) and how "systems of significant symbols" (Geertz, 1973) might be shaped by values and the significant structure associated with complex defense systems.

Purpose and Research Questions

The purpose of this research was to explore the nature of the social learning process within complex acquisition programs as described by PSMs currently assigned to acquisition programs within the Naval Air Systems Command. Specifically, I wanted to understand the reciprocal influences embedded within these acquisition programs as PSMs seek to achieve fiscally sustainable and high-performance projects. Secondarily, this research explored the effect of individual values and structure on social learning processes.

With the overarching premise that experiences within a system are individual social learning in situ, the thread of research questions was meant to address how an individual, as influenced by individual values and structure, shapes his or her interactions and behavior in a complex environment. Therefore, one relevant research question and two subquestions were developed:

1. How do PSMs describe the dynamic social learning process as they develop and execute their responsibilities during the acquisition and production phases of a complex program?
    a. What effect do an individual's values and environment have in this social learning context?
    b. How do PSMs describe the changing nature of their social learning?

Significance of the Study

Exploring practitioner-experienced systemic and systems-thinking problems through more rigorous research methods was expected to produce information for synthesis leading to systems thinking theory and construct expansion and more effective development of human capital, improvements in organizational structure, or a more adaptive culture. The results of this exploration provide a more in-depth understanding of specific linkages to value and emotional influences on systems thinking within a complex system as well as influence the logistics community by identifying frameworks that might aid in developing systems thinking human capital or potential team and organizational operational changes. The significance of this study lies within three major areas of theory, practice, and research.

Significance for Theory

This study contributes to theory development in several ways. First, while Jaques (1986) acknowledged that attributes, or "cognitive equipment" (p. 373), contribute to forming individual cognitive power, his theory does not directly address those areas of knowledge, experience, or values addressed in this study. Second, this study might expand the application of social cognitive theory (Bandura, 1986; Wood & Bandura, 1989) for individuals within complex systems.

Significance for Practice

A recent study that investigated the supply chain management (SCM) talent requirements of organizations indicated that the ability to learn (entry level), the ability to solve problems (middle level), and the ability to see the "big picture" (executive level) are among the most important skills for SCM professionals (Gibson, Williams, Goffnet, & Cook, 2013). While these three skills were identified as some of the most important, the study also identified the latter two as having among the least market availability (Gibson et al., 2013). This study sought to understand how individuals experience complex systems and structure in an environment similar to that of SCM organizations and may prove useful in evaluating individual abilities and values utilized in dealing with complex product support environments.

I have frequently experienced and shared the significant challenges faced by individuals, groups or work teams, and organizations in understanding the complex relationships of their work areas to other work areas, a larger system, or an operating environment. Additionally, when provided a common purpose or outcome for a system, I have witnessed decision making that either appeared to favor individual, subsystem-level

outcomes over optimal higher system-level outcomes or that failed to consider, due to lack of relevant schemas or organizational support, other product support design or support alternatives that may have been viable. My professional experience working with aerospace product support teams suggests that inadequate evaluation of anticipated environments or contexts and construction of somewhat auto-emergent, flexible, or preplanned solutions are likely framed by constrained or severely bounded systems thinking that is likely influenced by the individual values of those participating throughout the system's subelements.

While PSMs often possess much declarative knowledge obtained from years of experience and certification courses, they may not know how to effectively organize or call upon this knowledge within the context that confronts them (Kurfiss, 1988). This research evaluated evidence of individuals' experience structure and complexity while bringing their known facts and concepts in the discipline to bear within emerging challenges. Understanding approaches, or how they typically do things, within acquisition programs to solve complex problems might provide insight for improvements through courseware or structure to enable a broader understanding of potential applications (Kurfiss, 1988).

Understanding how values and abilities moderate an individual's experience within and about complex systems and the resulting behavior might provide insight on how to improve the alignment between organizational goals or structure and individual values for those performing logistics planning work on a complex program.

The February 2016 PSM Workshop conducted by the Department of Defense discussed that there are nearly 20,000 life cycle logisticians within the defense

acquisition workforce, of which several hundred are specifically designated as PSMs. This presents significant human resourcing and assignment implications such as placement of these individuals within complex programs. One example is that the level (e.g., GS-15 or 0-6 versus some lower or higher grade) of government employees assigned as program managers is based on acquisition category, which is predominantly based on the cost of the program rather than the complexity of the task. Jaques's (1986) stratified systems theory would seem to indicate that assignment should be based on the degree of cognitive power required to accomplish the task and the individual's time horizon. This would imply different selection procedures for program managers as well as supporting staff. Additionally, if a program could be made more efficient in terms of time, potentially more people at lower grades could participate within the system and be more effective. In trying to provide a service in my current role as a sustainment planning consultant for the government on aerospace development programs, I have a personal interest in understanding individuals and groups that are involved in optimizing product design and support solutions.

Finally, this study might assist in uncovering more effective ways to facilitate social learning for PSMs so that their "knowledge, values and action competence may develop in harmony and increase their potential to participate more fully and effectively in the resolution of emerging personal and organizational issues" (Wals, 2007, p. 39).

Significance for Research

There is a need for theory-based research in the area of logistics and SCM (Defee, Williams, Randall, & Thomas, 2010) to solidify it as a discipline (Chicksand, Watson, Walker, Radnor, & Johnston, 2012). This is especially true for research involving social

psychological/sociological and psychological theories for individuals (Defee et al., 2010) as well as structuration (Sachan & Datta, 2005). This study provides contextual evidence and a more in-depth understanding of the interactive effects of structuration, individual cognitive determinants, and systems thinking as it pertains to an individual within a system. The findings have implications for logistics and SCM research, cognition research in both structure and content, and for researchers themselves, as constraints on what gets noticed or not likely affect research approaches.

The inclusion of individual values in this study contributes to more current sociological research on the nature of value systems and their place in action, understanding reciprocal influences "between social structural positions and individual functioning and decision making" (Hitlin & Piliavin, 2004, p. 383). This study also provides a better understanding of structural sources of value prioritization and individual differences in unique contexts (Schwartz, 2011).

Conceptual Framework

Individuals' capability is affected by their cognitive equipment (Jaques, 1986). Based on strata, it is suggested that individuals' form and use of systems thinking falls into one of three categories, functional, structural, and interpretive, with the latter being the most socially/cognitively complex and the former being less complex (if one could imagine in the form of Boulding's hierarchy), as suggested by Jackson (2009). Further, when engaging behavior within a certain complex environment, an individual's values may moderate the manifestation (or level of engagement) of that capacity.

In the area of cognition, Walsh (1995) summarized literature covering multiple levels (individual, group, organization, and industry) and provided examples for

knowledge structures and content. Walsh's (1995) review highlighted support for research on cognitive frame representation, use, and development within those levels of analysis while also addressing methodological issues and next steps for research. Among the areas Walsh mentioned that are most relevant to this study are "understanding how accurate a knowledge structure must be to be useful to the person employing it" (p. 303); "relationships between cognition, actions, amended cognitions, and redirected actions" (p. 304); "how cognition and social processes commingle" (p. 305) and are translated "into action in a firm" (p. 306); "understanding changes in knowledge structure rather than static assessments" (p. 306); and "whether a socially induced change is more enduring than an information induced change" (p. 307).

Zerubavel's (1997) idea of attending in cognitive sociology revolves around the notion of mental horizons and mental focusing that provide mental limits and constrict thinking by providing boundaries to what we deem relevant and irrelevant.

It is believed that an integrated understanding, through this research, of those influences on cognitive and social interaction that are manifested in an individual's performance within a complex system will contribute to higher system effectiveness. The dynamic and concurrent interactions between individuals while operating within a complex system are likely similar to the triadic reciprocation framework expressed by Wood and Bandura (1989). To investigate the dynamic interactions of individuals within their environments, I selected Bandura's (1986) triadic framework used in social cognitive theory, as depicted in Figure 1.3.

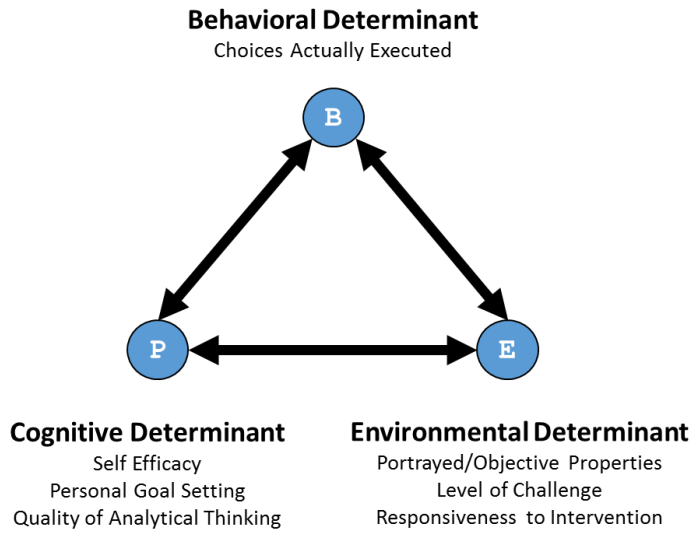

Figure 1.3. Bandura's triadic reciprocal framework. Adapted from Bandura (1986, p. 24).

While the basic social cognitive theory model provides a necessary view of personal, behavioral, and environmental relationships at a conceptual level for this study, it is not specific enough to characterize and link the unique context (e.g., interactions within a highly complex product acquisition system with strong structuration) or variables (e.g., individual values and actions) of this study from a conceptual level to an operational level, as suggested by Schwab (1999). In order to be explicit about what is included or not included in the study, I have identified the operationalized variables that align with the basic social cognitive theory framework and my context, as depicted in Figure 1.4. While each set of variables may be supported by various frameworks or taxonomies (e.g., Jaques's cognitive stratum, Jackson's three forms of systems thinking, Boulding's levels of system complexity), they are linked in a unique way using actual theory.

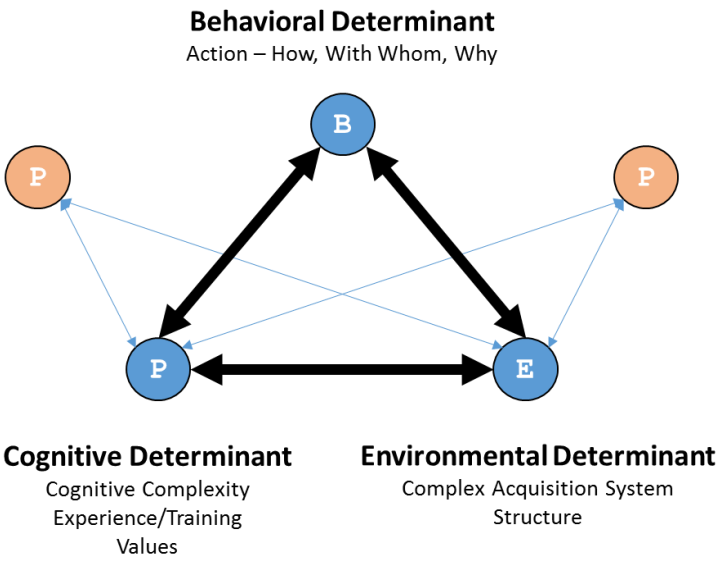

Figure 1.4. Conceptual frame depicting operationalization of Bandura's triadic reciprocal framework.

Summary of the Methodology

A case study methodology was well suited to answer the research questions. Case study is defined as a purposive, logical, in-depth investigation of a bounded system using multiple sources of data situated in a larger context over time, selected to maximize the opportunity to learn about the phenomenon (McCaslin & Scott, 2003; Merriam, 2009; Smith, 1990; Stake, 1995; Yin, 2009). It results in operationalized rich descriptions relating particular and unique understandings of 'how,' 'what,' and 'why' connected to supporting theoretical principles and propositions. Based on my understanding of a case study, it seems an especially appropriate fit for understanding how values affect individuals and their ability to employ systems thinking within a bounded context of a public-sector product and support acquisition. The case was further bounded by desiring to understand a particular set of individuals (e.g., logisticians) or functional categories of

individuals (e.g., systems engineers, engineers, logisticians, etc.) in acquisition programs. Although I used interviews to determine individual value orientation, cognitive capacity, and systems thinking frames, the goal was to represent the analysis in terms of a contextual case or cases.

Smith (1990) provided a strong argument that the case study is a description, based on detailed examination, logical analysis, and connection to supporting theoretical principles, of an event, phenomenon, or set of events that provides an operationalization of the connections. In this case, I used Bandura's (1986) social cognitive theory: the triadic, dynamic relationship between a person (as influenced by values/cognitive complexity), the environment (the complex system and organizational values), and their behavior (systems thinking and action).

Delimitations and Limitations of the Study

This study was delimited to public-sector defense acquisition program offices in the aerospace sector. Not only was this an area that I am very familiar with, but it provides further delimitations relative to time (PSMs may be responsible for managing products in varying phases of the life cycle) and space (sector and industry) and provides an adequate number and type of individuals in the population of concern. During the earliest periods of an acquisition program, a minimum number of personnel are available to develop requirements and tend to market research, administrative, and contractual functions. The individuals of interest are logisticians engaged in both influencing the complex system under development and developing the support system required to sustain a product. Both objectives involve conceptualizing potential interactions with the operational environment as well as interactions between individual elements of the

support system to provide the highest level of platform availability at the lowest possible cost.

Some potential limitations of the study related to access to available programs in the phase of interest and, due to sector, the generalizability to privately run programs or other products (e.g., cars, ships, trains, etc.). However, it is suggested that the phenomena of interest and interactions at the individual level will be applicable to development of many complex systems. Other possible limitations are related to access of available documentation or the limited observation of participants.

Definition of Terms

Table 1.1 defines terms used throughout this dissertation.

Table 1.1
Definition of Terms

Term	Definition	Source
Agency	Individuals' capability of doing things, rather than the intentions they have in doing them.	Giddens, 1984, p. 4
Cognitive equipment	Knowledge, experience, and skill.	Jaques, 1986
Cognitive frame	Cognitive schemas that serve as guides to interpretation.	Kaplan, 2008
Cognitive power	The scale or degree of complexity of cognitive processes.	Jaques, 1986
Cognitive processes	Processes by which individuals form or pattern the worlds they construct and work with.	Jaques, 1986
Declarative knowledge	The facts and concepts in a discipline.	Kurfiss, 1988, p. 6
Framing contests	How actors attempt to transform their own cognitive frames into others' predominant frames through interactions.	Kaplan, 2008
Logistician	An individual responsible for a total system perspective of all the activities associated with the initial design for logistics and supportability of a system and support of that system through the entire life cycle.	Adapted from Blanchard, 2004, p. 1

Term	Definition	Source
Structuration	The structuring of social relations across time and space in virtue of the duality of structure, where "structure enters into the constitution of the agent, and from here into the practices that the agent produces."	Stones, 2005, p. 5, citing Giddens
Structure	A set of social rules and resources that are reflexively implicated in interaction.	Baert, 1998, p. 101
Systems thinking	The means by which an individual has and expresses knowledge of the wholeness and the dynamics of a system.	Checkland, 1999, p. 4
Temporal horizon	Maximum time span at which a person can work at a given point in time. Sets the limits of the world of purpose and intention within which one lives, constructs patterns, and organizes one's life and aspirations.	Jaques, 1986
Values	Desirable trans-situational goals, varying in importance, that serve as guiding principles of a person or other social entity. Implicit in this definition of values as goals is that (1) they serve the interests of some social entity; (2) they can motivate action, giving it direction and emotional intensity; (3) they function as standards for judging and justifying action; and (4) they are acquired both through socialization to dominant group values and through the unique learning experience of individuals.	Schwartz, 1994

CHAPTER 2:

REVIEW OF THE LITERATURE

Introduction

This literature review informs the research conducted in this study. Based on the selected variables and their operationalization within Bandura's (1986) social cognitive theory, I reviewed literature in the areas of systems thinking, individual values, experience, cognitive complexity, and system complexity.

A continuous state of change is becoming more evident in today's environment, which requires an unending state of preparedness and understanding of the system in question and the influence of the environment. In this "new reality, agility and the ability to morph as the operating environment changes are requisite for sustained organizational well-being because there is no fixed point at which the organization arrives at success; the organization is in a perpetual state of arriving" (Malone, 2007, p. 5). Understanding individuals' values and behavior, in the form of systems thinking, within complex systems would thus seem crucial to understanding the potential of a system's agility and adaptability. "Neither capabilities nor challenges remain static" (Percival, Crous, & Schepers, 2003, p. 61).

While fundamental questions remain as to 'how' systems thinking develops, there is evidence supporting the importance of experiential learning, certain personal characteristics, and a supportive context. However, there is little evidence of how individual values affect the ability of logisticians to effectively think in terms of systems while operating within a complex system to enhance cross-understanding and ultimately the effectiveness of public-sector defense programs. This exploration of practitioner

values and cross-understanding using an adult learning or social-cognitive theory framework was expected to produce information that would both improve systems thinking theory as it relates to individuals within a complex system and lead to more effective development and application of human capital.

Search Strategy and Method of Literature Review

The premise prompting the literature review is that the ability of individuals to identify a system, know their place within it, and understand the dynamics of the interrelationships through systems thinking is critical to the system's adaptability and sustainability. Individual and organizational values are likely to moderate individuals' ability when applying systems thinking.

In the logistics arena, there has been minimal investigation of the individual within a complex system. Typically, processes and tools are the focus in the form of practice updates established by Blanchard's (2004) work in logistics engineering and Jones's (2007) work in supportability engineering. Some exceptions are logistics and supply chain maturity evaluations from the Logistics Management Institute (Boone et al., 2009; Reay, Colaianni, Harleston, Maletic, & Marcus, 2006) and the Council of Logistics Management Professionals (Blanchard, Harper, Hill, & Martin, 2010) that have marginally touched on systems thinking practices or the skills and abilities of individuals within a system. However, there have been many recent efforts to highlight systems thinking behavior, such as mandating top-level product or service performance measures and organizations' profession that they are top systems integrators. These actions suggest not only a cultural influence but also a structural influence. Concurrently, both industry and government are struggling with ways to develop more holistic logisticians through

recent efforts by the National Defense Industrial Association and as part of the Logistics Human Capital Strategy of the Department of Defense (DoD) (DoD, 2008). Most of the current literature in the area of logistics appeared to be related to supply chain improvements and modeling (Moon & Kim, 2005) or in maintenance improvements disguised as "flexible systems management" (Garg & Deshmukh, 2009), both of which are only subcomponents of a logistics or product support system. This suggests that there is a significant need to bridge the current conversations to the logistics community and that there is a general need for more empirical research in the systems or systems thinking communities.

The initial search for the relevant systems thinking literature was done during June 2010 using ABI/INFORM and the search terms of "capacity for systems thinking" and "systems thinking." The search was delimited by selecting only publications that appeared within the previous 10 years. A search of "capacity for systems thinking" returned 43 articles, and a quick review yielded 18 articles for potential use. The search of "systems thinking" yielded 123 articles, approximately 30 of which had potential value, but many of the articles were duplicates of the previous search. Further searches were made using "logistics and structuration" (1 return) and "logistics and human capital" (5 returns). Most of the articles selected were conceptual and usually from learning-, engineering-, or systems dynamics–oriented journals. Other literature such as dissertations and books was obtained using reference lists from the initially captured articles. The reference lists from the selected articles were particularly valuable in providing additional avenues for literature. A separate search of dissertations was also conducted with the following results: "capacity for systems thinking" (60 returns, limited

to 2005 and later, of which 6 were selected), “logistics and systems thinking” (0 returns), “complex adaptive systems and logistics” (3 returns), “capacity and critical thinking” (12 returns), “logistics and human capital” (0 returns), and “logistics and critical thinking” (0 returns). It was observed that use of particular words, particularly when using logistics-related criteria, significantly reduced results.

A search of the literature on values was conducted via Proquest during February 2010, and 11 relevant articles for individual values were obtained. Additionally, 6 articles were obtained that related to organizational values.

The chapter begins with the theoretical frame of social cognitive theory (SCT) and then explores literature related to the operationalized individual and environmental factors within the theory. Closing sections discuss methodological issues, directions for future research, and implications.

Social Cognitive Theory

SCT provides an “explanation of human functioning in terms of a model of triadic reciprocality in which behavior, cognitive and other personal factors, and environmental events all operate as interacting determinants of each other” (Bandura, 1986, p. 18). This triadic and dynamic relationship of determinants is depicted via the model shown in Figure 2.1. “Reciprocal refers to the mutual action between causal factors while determinism signifies the production of effects by certain factors” (Bandura, 1986, p. 23).

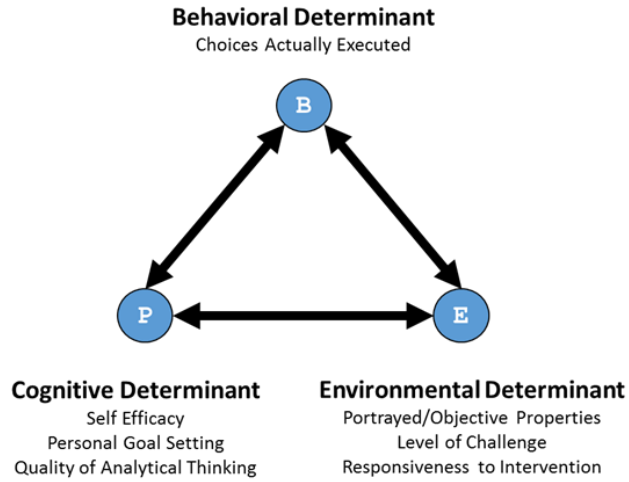

Figure 2.1. Bandura's triadic reciprocal framework. Adapted from Bandura (1986, p. 24).

For personal factors, SCT describes the nature of individuals in terms of symbolizing, forethought, vicarious, self-regulatory, self-reflective, and biological capabilities. Individuals have symbolizing capabilities that enable them to "process and transform transient experiences into internal models and create ideas that guide future action" (Bandura, 1986, p. 18). Purposive behavior of individuals is regulated by forethought as they "anticipate likely consequences of prospective actions and plan courses of action for cognized futures" (Bandura, 1986, p. 19). Cognitive symbolic representation of the future gains causal efficacy through regulating foresightful behavior in the present through reflection (Bandura, 1986, p. 19). Individuals also have the capability to learn vicariously, and the less an individual is able to rely on innate cognitive ability the stronger the dependence on modeling (Bandura, 1986, p. 19). Self-regulatory capability comes into play through the comparison of internal standards, previous actions, and creation of motivational forces that are also sometimes externally influenced (Bandura, 1986, p. 20). Individuals also have a self-reflective capability that

enables them to analyze experience and thought processes and, after evaluation, judge their capabilities in dealing with different realities (Bandura, 1986, p. 21).

Even with all these capabilities, individuals are still constrained to some extent by their psychological and physiological development at any given time (Bandura, 1986, p. 22). As there are many possible influencing factors within both the person and the environment, the interactions of any given set of factors can produce different actions and results. Bandura also recognized the time component for "causal factors to exert their influence," which "varies for different activities" (Bandura, 1986, p. 25), suggesting the ability to study factors interactively rather than simultaneously. Bandura (1986) suggested that operationalization of the determinants should be "specifically tailored to the domain of functioning being analyzed" (p. 28), while also recognizing that different analytical methods may be necessary to provide insight into the probabilities and asymmetry of the determinants rather than quantitative cause-and-effect generalizations (p. 26). This study operationalized the determinants as shown in Figure 2.2.

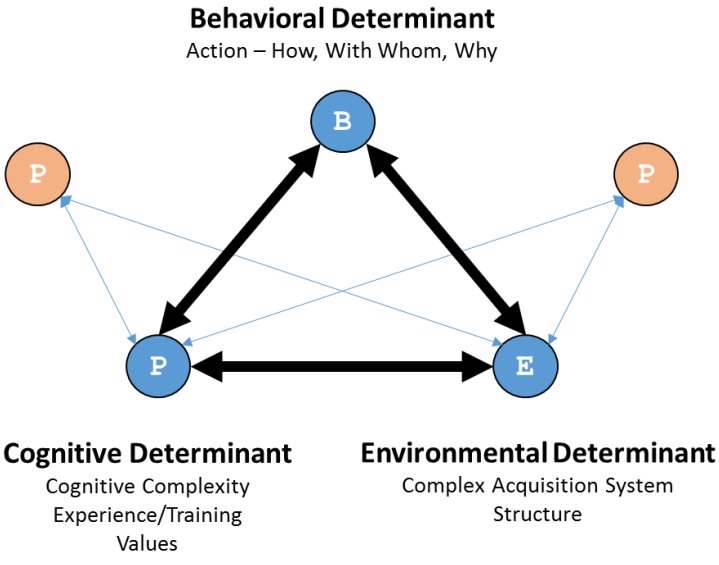

Figure 2.2. Operationalization of Bandura's triadic reciprocal framework.

In the area of this study's operationalized personal determinants, SCT provides additional insight with respect to how individuals may be influenced through fortuitous intersects. "Value preferences partly govern human behavior and self-evaluative standards," and individuals are "more likely to be influenced when similar values are shared with others as well as when there is a lack of internal guides and normative influences" (Bandura, 1986, p. 35). Emotional ties have a similar influence on behavior, when satisfaction is gained through affiliation with similar interest and skill groups as well as with other individuals (Bandura, 1986).

In exercising agency, SCT suggests that "given the same environmental conditions, persons who have greater abilities will have greater self-influence or agency" (Bandura, 1986, p. 39). Additionally, "the more novel the circumstances and environment encountered, the more one has to rely on inferential thought for guidance" (Bandura, 1986, p. 39).

Individual Factors Within the Theory

This section discusses several individual factors of social cognitive theory that are relevant to the operationalized model used for this study: stratified systems theory, values, and systems thinking. It also provides information on systems thinking frameworks and the linkages of values and cognition to systems thinking.

Stratified Systems Theory

Jaques (1986) discussed the development of intellectual capability to "engage in goal-directed behavior" and focused on cognitive processes. He defined the nature of these processes as those "by which individuals form or pattern the worlds they construct

and work with" (p. 362). He also developed cognitive strata to provide a means for measuring cognitive power based on the "degree of complexity of cognitive processes" and its pattern of development. Each stratum represents the "maximum time span a person can work with or their time horizon" (p. 364). Although "Jaques did not address the dynamics underlying maturation" within an individual, he did "view it as a natural growth process that could be stunted by temperament or inexperience" (Jacobs, 2010, p. 63). In increasingly complex environments, there is a "longer time horizon before one can see the results of decision-making" (Percival et al., 2003, p. 62). Stratum ranges from specified work with inflexible rules through constructing the future, as shown in Table 2.1.

Table 2.1
Strata and Their Characteristics

Stratum	Time span	Characteristics
I	<3 months	Concretely defined work. Inability to detach and relate experience to other work.
II	3 months-1 year	Can articulate work and ideas. Ability to reflect and problem solve.
III	1-2 years	Can cope with known workload and probable workload for additional year. Can extrapolate from current trends.
IV	2-5 years	Can compare known systems. Maintains a patterned rule structure.
V	5-10 years	Can forecast and plan. Can operate a complex system, modify boundaries, and see interdependencies.
VI	10-20 years	Can cognitively order relevancy, prioritize, and conceptualize whole systems.
VII	20-50 years	Can construct the future through new ideas.

Note. From Jaques (1986, pp. 364-369).

In exploring complex environments to understand individual action and competence in future forms of work, Van Der Merwe and Verwey (2007) used Jaques's stratified systems theory, as modified into levels of work capability by Stamp (1991).

While the study did not indicate a difference in required competencies between current and future work, it did suggest a need for individuals to have an increased and broader capability for dealing with increasing complexity and an additional focus on values (Van Der Merwe & Verwey, 2007).

Alignment of key targets within a system using incremental time horizons provided increased understanding for the vertical integration (in terms of time horizons) and horizontal (functional) integration of planning (Jaques, Bygrave, & Lee, 2001) and identified the need by accountable individuals to have the requisite perspective. Incremental time alignment of tasks seems fundamental to project management, and individuals must be able to conceptualize and express system dynamics to have the necessary perspective and operate within the system effectively. Additionally, expressing a system in a different way may be necessary when operating between individual strata; additional resources may be required when cognizing from high to low complexity, and more tolerance may be required when cognizing from low to high (Hu, 2008). In order to re-cognize within a system, different forms of systems thinking orientation may provide a balance or requisite variety (Ashby, 1956) for harmonization of the individual within the system that would then enable action or further regulation of the system.

"Complex problems are understandable only when people have or can build mental models of equal complexity" (Jacobs, 2010, p. 68). In order to build the requisite models or learn, new forms of system representation might be needed to reduce ambiguity and contradiction; patterns and action scripts can then be established to enhance decision durability during system emergence (Jacobs, 2010).

Values

The study of values in the social sciences began with two major views. From a behaviorist perspective, Kluckhohn and Parsons viewed values as leading to action in a deterministic or functional sense (Hitlin & Piliavin, 2004) through "influencing an individual's selection from available modes, means, and ends of action" (Kluckhohn, 1951, p. 395). From a constructivist perspective, Rokeach (1973) characterized values as "enduring beliefs of preferable conduct or end-state of existence" (p. 5) that exist as part of a system of choice and action in looking forward and as justification or explanations in looking backward (Rokeach, 1979). Where Kluckhohn emphasized action in values, Rokeach stressed the nature of values through assigning action meaning (Hitlin & Piliavin, 2004). Further, Rokeach provided a hierarchy of individual values that might prove valuable in static or very disparate contexts (e.g., family life versus work life), while others such as Schwartz sought a more trans-situational and dynamic explanation that rated levels of values in varying contexts (Stackman, Pinder, & Connor, 2000).

The Schwartz (1994) theory of basic values, shown in Figure 2.3, "identifies 10 basic personal values and specifies an integrated structure of motivationally compatible and conflicting relations among these values" (Schwartz, Caprara, & Vecchione, 2010). There are also tensions between competing value types, shown in two bipolar dimensions on the outside of the circle in Figure 2.3 (Schwartz, 1994, p. 25). The first dimension, contrasting openness to change with conservation, "opposes values emphasizing own independent thought and action and favoring change (self-direction and stimulation) to those emphasizing submissive self-restriction, preservation of traditional practices, and protection of stability (security, conformity, and tradition)" (Schwartz, 1994, p. 25). The

second dimension, contrasting self-enhancement with self-transcendence, "opposes values emphasizing acceptance of others as equals and concern for their welfare (universalism and benevolence) to those emphasizing the pursuit of one's own relative success and dominance over others (power and achievement)" (Schwartz, 1994, p. 25).

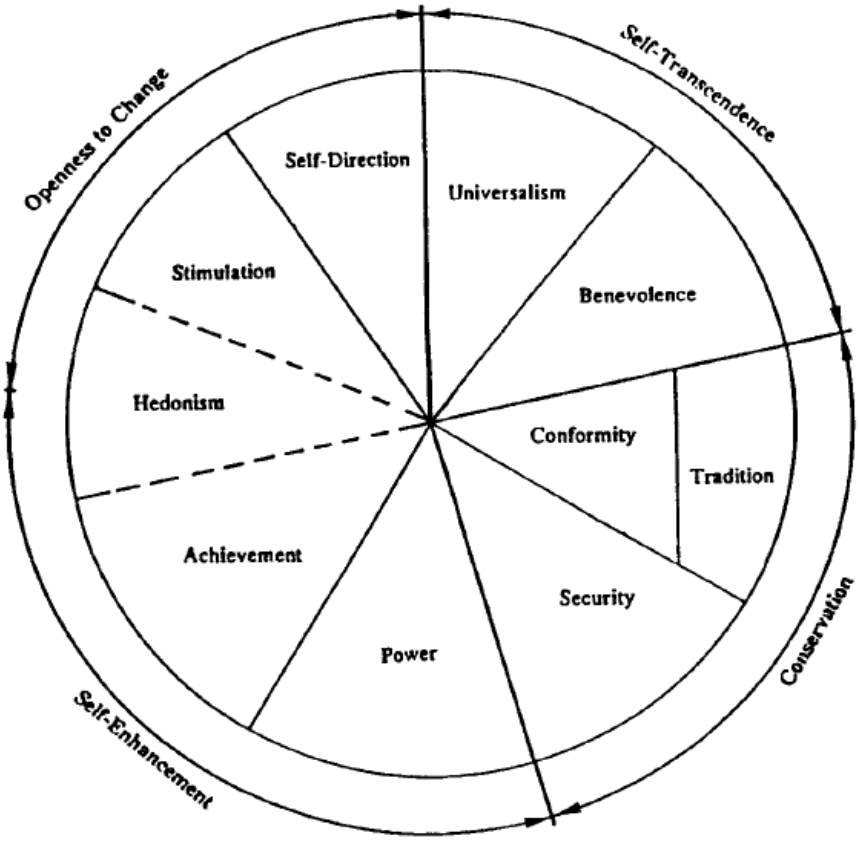

Figure 2.3. Model of 10 motivational value types and their relations. Reprinted from Schwartz (1994, p. 24) with permission from Wiley.

The theory of basic individual values was subsequently "refined to 19 values that are conceptually distinct values intended to provide greater universal heuristic and predictive power" (Schwartz et al., 2012, p. 684). In addition to the first two dimensions, this model added the dimensions of social focus versus personal focus and growth/anxiety-free versus self-protection/anxiety avoidance, as depicted in Figure 2.4.

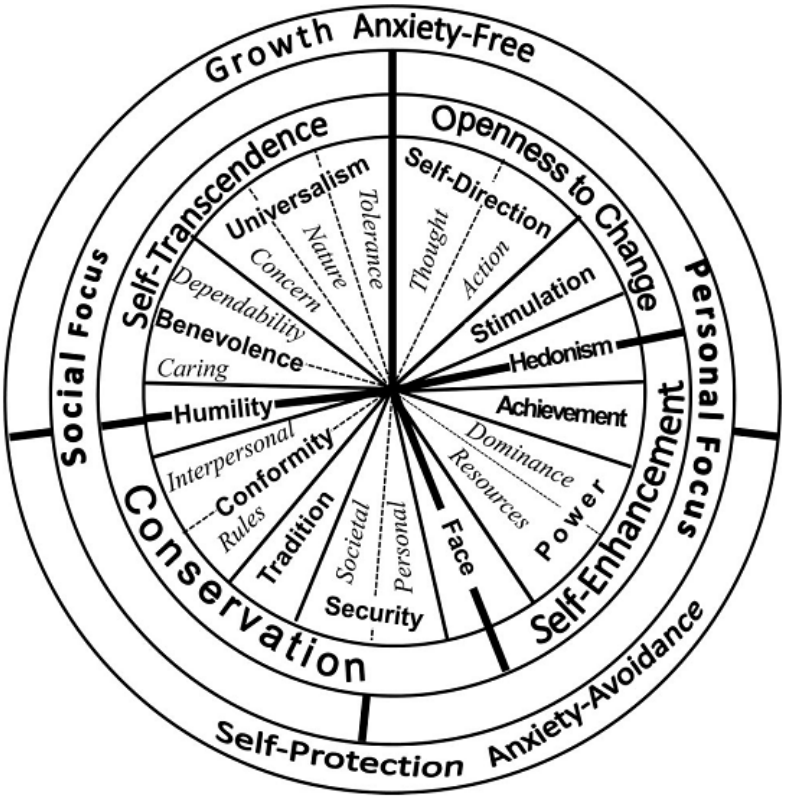

Figure 2.4. Model of 19 motivational value types and their relations. Reprinted from Schwartz et al. (2012, p. 7) with permission from the American Psychological Association.

Schwartz et al. (2012) explained that "the refined theory gives researchers the option of working with as large or as small a set of values as is appropriate to their purpose, . . . from 2 to 19" (p. 665).

Systems Thinking

Systems thinking is a frequently used term. Eastern views or philosophies emphasize holism, and Western views emphasize more analytic or reductionist practices (Nisbett, Choi, Peng, & Norenzayan, 2001) that do not necessarily reflect systems thinking generally but have important uses in mental models related to systems thinking methodologies. Relatively recent history suggests that systems thinking has lineage from

development of systems theory, “systems dynamics, systems science, and systems engineering who all lay claim to definitions of systems thinking” (Lamb, 2009, p. 31). “The commonalities between these definitions include an emphasis on wholes, system-level issues, and some derived ability to judge and choose between alternatives based on their system-wide impact” (Lamb, 2009, p. 31).

General definitions of systems thinking vary, from defining the skill as the “use of one’s abilities to apply sound reasoning in a given situation” (Dorner, 1996, p. 199) to applying 31 different types of thinking. Ackoff suggested that systems thinking is a systemic mode of thinking based on holistic as opposed to reductionist methods. Whereas reductionist thinking begins by analyzing the parts of a whole, and from the properties of the parts deriving the properties of the whole (Lamb, 2009), holistic or systems thinking begins with the system and derives the parts from the properties of the whole (Lamb, 2009). Given that systems are greater than the sum of their parts, this definition clarifies the benefits of applying systems thinking to most any endeavor.

Another definition of systems thinking emphasizes understanding interactions within complex systems as a departure from linear thinking rooted in simple cause-and-effect logic (Lamb, 2009). Systems thinking definitions derived from systems dynamics include and build upon the components of the generic definitions, emphasizing the role of holism, interactions, and dynamics. Definitions based in systems dynamics are typified by an emphasis on identifying patterns of behavior and representing these patterns through cause-and-effect relations (Richmond, 1993). To support exploration of these cause-and-effect relationships, systems thinking is supported by “a body of knowledge and tools developed over the past to make full patterns clearer and to help us see how to

change them effectively" (Senge, 2006, p. 7). Lamb (2009) indicated general themes of systems thinking in Figure 2.5.

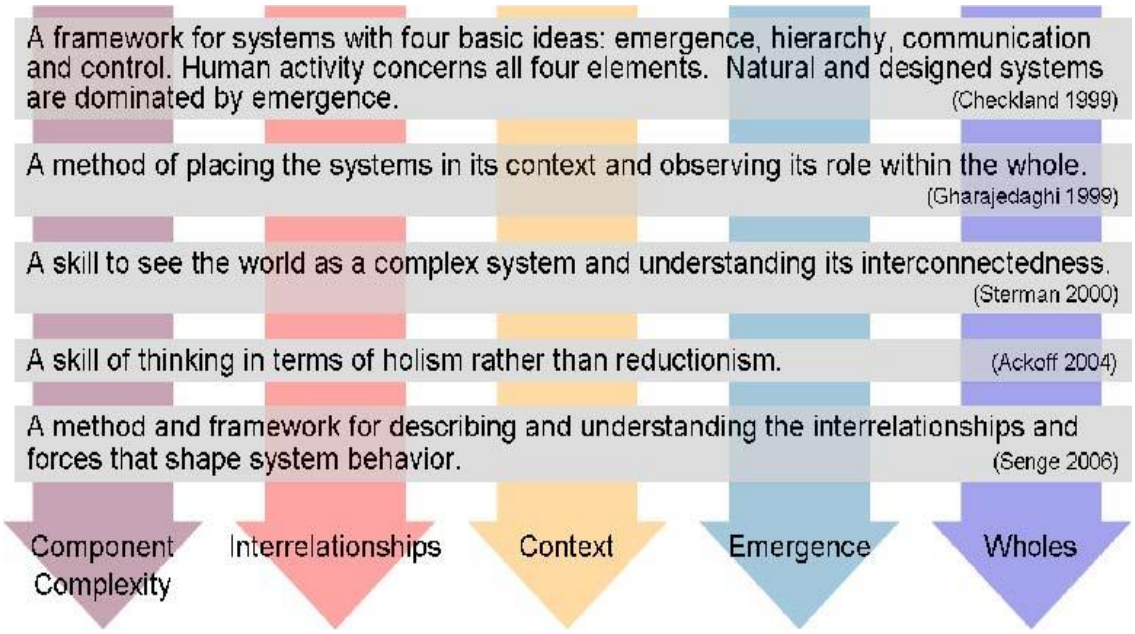

Figure 2.5. Themes of systems thinking. Reprinted from Lamb (2009, p. 33) with permission from the Massachusetts Institute of Technology.

Minati (2007) defined systems thinking as "cultural views based on systemic principles" (p. 482), which opens the door for considering cultural and underlying structural aspects of research in systems thinking. Davidz (2006) provided a systems thinking framework with five characteristics—"(1) componential, (2) relational, (3) contextual, (4) dynamic, and (5) modal elements"; she defined systems thinking as "utilizing modal elements to consider the componential, relational, contextual, and dynamic elements of the system of interest" (p. 119).

Chaordic systems thinking as a variation of systems thinking provides additional support for the capacity to understand changing events and dynamics of a system in terms

of chaos. Chaordic systems thinking provides a conceptual framework for using system complexity to understand human interactions in learning organizations and expands systems thinking using a 'chaos' lens to suggest a systemwide approach for growth in social systems (Eijnatten, 2004).

In general, "the means by which an individual has and expresses knowledge of the wholeness of a system" and its dynamics is systems thinking (Checkland, 1999, p. 4). Having knowledge of a system and the interrelationships of its components suggests an understanding of how a system is cognitively framed or structured by an individual. Being able to express system dynamics suggests cognitive functioning and the use of cognitive processes in varying application by an individual. Additionally, framing and expression may be influenced by multiple interactions, dynamics, and structure, as shown in Figure 2.6; the effectiveness of an organization "may depend not so much on actions as on the interactions among its members" (Gharajedaghi, 2011, p. 104).

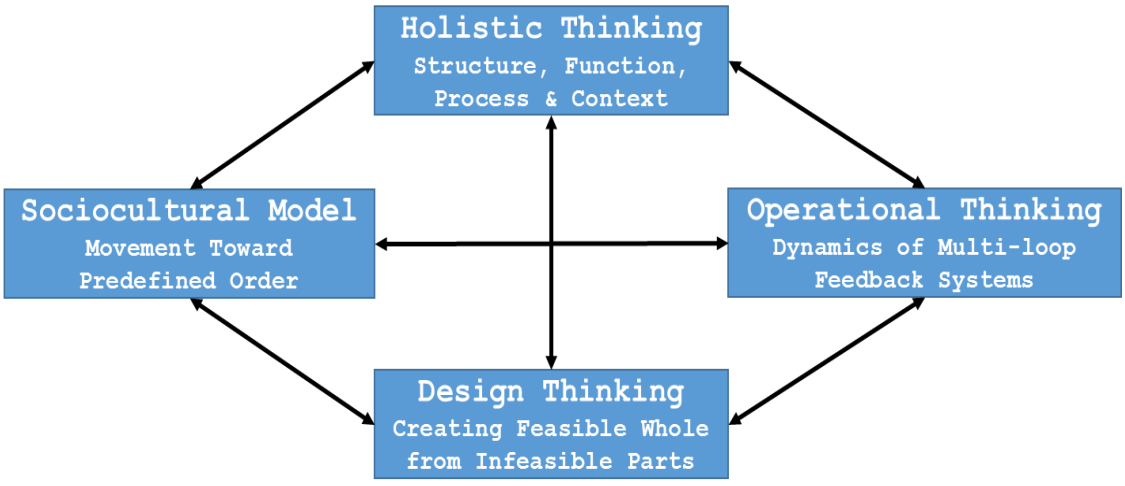

Figure 2.6. Foundations of systems thinking. Reprinted from Gharajedaghi (2011, p. 23) with permission from Elsevier.

Systems dynamics, systems science, and systems engineering are having conversations that provide definitions of systems thinking. In the logistics community, the conversation is embedded in the idea of an integrated logistics system or integrated logistics support. The commonalities between definitions include an emphasis on wholes, system-level issues, relationships, and dynamics to achieve outcomes and to be able to choose between alternatives based on their system-wide impact. However, little is mentioned about how individuals' values influence their ability to perform within a complex system to provide the most effective program outcome.

From a scholarly perspective, my preliminary research provides some indication that systems thinking is relevant to the problem described. An initial review of systems thinking literature suggests that the ability to understand system behavior and plan appropriate responses is influenced to some extent by learning, cognition, individual values, and organizational values. However, minimal empirical evidence exists to support these influencing linkages, particularly in logistics contexts. Further, there is a lack of understanding of potential application of certain systems thinking frameworks (e.g., interpretive, functional, structural) that appear to align with components of individual values and behavior within a complex system.

Cavaleri and Reed (2008) suggested that "common reasons for performance failures are related to erroneous learning caused by feedback misperception, low-quality knowledge, system element imbalances, and failure to account for time delays" (p. 71). This finding suggests that leaders may want to take an approach similar to project management of the system to create opportunities for learning in context and cultivate capacity. The idea of using systems thinking to repurpose resources is also noted through

"data-driven dialogue on holistic thinking," which includes the "restructuring of staff' (Davis & Somerville, 2006, p. 127). It would seem that this approach would also be useful for restructuring other resources such as transportation, distribution, warehousing, and support equipment within logistics systems as well as providing decision support information for product development decisions that may impact support resources in the future. Relative to these supply chain activities, other research has indicated that individual systems thinking ability greatly influences the practice of supply chain management (Moon & Kim, 2005). "Practice" in this context needs to be defined, as it appears to reflect the ability to come closest to correct order quantity, with some considerations for cost, and the research focus has been more on organizations than individuals. However, it is suggested that to improve efficiency with more realistic solutions, inventory and production managers have to make decisions with systems thinking and consistency. In the area of transportation planning, practitioners are thinking about "sustainable communities and regions and want to know about performance of regional multi-modal transportation systems" (Gayle, 2009, p. 48) and how to link various levels of regional and national management performance to the same objectives for cost and service factors.

Key scholarly contributions to systems theory and systems thinking include Von Bertalanffy's (1971) and Katz and Kahn's (1966) general systems theories, Ackoff and Emory's (1972) purposeful systems, Giddens's (1984) structural aspects, and Hall's (1962) hard systems engineering. More recently, Checkland's (1999) soft systems methodology, Maturana and Varela's (1980) autopoiesis and cognition, the works of Jackson (2000), Flood and Romm (1996), Midgley (2008), and Mingers (2010) in critical

systems thinking, and the connection with chaos and complexity by Gharajedaghi (2011) have heavily influenced current conversations in systems thinking. Based on a literature review of current journal articles, there is evidence that the systems thinking conversation continues but that "development of systems thinking skill is poorly understood" (Lamb, 2009, p. 2) and there is still very little empirical evidence of how systems thinking ability, capacity, or effectiveness is improved. Jackson's (2009) literature review of systems thinking and applied systems thinking provides a framework and categorization of literature over the last 50 years that will help frame future discussions, along with Meadows's (2008) work on thinking in systems.

Systems thinking definitions vary widely in detail but appear to share several themes: the effect of higher-level systems on lower levels or subsystems, organization for a common purpose, and commonly understood boundaries brought to bear by cognitive models and perceptions of that common purpose.

Systems Thinking Frameworks

From a learning organization perspective, Eijnatten (2004) provided a CST model to help describe systems capacity and interactions with a description of nonlinear change from 'old thinking, old doing' to 'new thinking, new doing' in systems. This model uses a holistic hierarchy as a reference for suggesting that interactions move an organization to various opportunities based on levels of holistic thinking. Based on consciousness, connectivity, indeterminacy, dissipation, and emergence at varying levels of complexity in terms of the organizational mind and culture, it is suggested that varied worldviews produce integrated knowledge of wholes needed for sustainable and learning organizations (Eijnatten, 2004).

Pollack (2006) provided alternative conceptual thinking models in terms of relationships in his review of hard and soft systems thinking paradigms and how models and studies are typically portrayed in opposition to one another. He suggested that researchers and practitioners understand relationships and interactions similar to systems thinking itself when trying to use a particular lens of systems thinking so that they can consider cause and effect alternatives as much as they consider continuums (Pollack, 2006). Pollock (2006) also suggested that different levels (conceptual to practical and philosophy to tools) are mutually supporting and that areas of "ambiguity" and "incommensurability" can be joined by a meta-paradigm so that facets of other theories and measurements can be taken into account with specific contexts using systems thinking (Pollack, 2006).

Systems thinking generally involves being able to define purpose to establish system boundaries and then understand components, relationships, dynamics, and outcomes based on those dynamics. Jackson (2009) characterized research on systems thinking into functionalist, structuralist, and interpretive types of systems thinking frameworks; these frameworks are useful when applying a systems thinking construct to understand an individual's influence on systems thinking and suggest the influence on culture by systems thinking (Minati, 2007).

Functionalist systems thinking. Functionalist systems thinkers, as related by Jackson (2009),

> use mechanistic or organismic models to ascertain that everything in the system is functioning well to promote either efficiency or survival. They believe that an understanding can be gained of how operational and organizational systems behave by using scientific methods. Knowledge is gained about the nature of the parts of the system, the interrelationships between the parts and the relationship

> between the system and its environment; and managers are, therefore, put more in control. (p. S26)

This produces somewhat of a separation between hard and soft systems thinking, with hard systems thinking the focus in this framework.

> Hard Systems Thinking has been revolutionary in valuing knowledge directly relevant to clients and in developing models as an alternative to laboratory experiments for testing hypotheses concerning system behavior. However, a dependence on predefined goals and models that represent systems as logical machines limits its domain of applicability. (Jackson, 2009, p. S26)

This goal-oriented type of systems thinking was identified by "Ackoff and Emery as early as 1972 when they developed the concept of purposeful systems to reinforce the idea that systems exist in the context of specific goals" (Parent, Roy, & St-Jacques, 2007, p. 85).

Structuralist systems thinking. Jackson (2009) defined structuralist systems thinking:

> "Structuralist" systems thinkers follow von Bertalanffy, in spirit if not in detail, in looking for those key mechanisms or structures that are fundamental to system behaviour whatever system type we are dealing with. They seek to dig "beneath the surface" to discover the most important structural aspects that lie behind system viability and performance. This "structuralist" approach enables analysts, in their view, to determine at a deeper level what is going wrong with the system and to learn how to manipulate key design features so that the system can survive and be effective over time. (p. S27)

This framework would seem to be particularly useful for establishing boundaries and ground rules to facilitate organizational breakdown analysis or metrics decomposition, determine a system's current state, or perform sensitivity analysis for system components or organizational change initiatives.

Interpretive systems thinking. To understand a perceived state of the system, one would likely have to look at underlying assumptions and values by using interpretive,

constructed, subjectivist systems thinking. This framework is most closely aligned with studying social behavior and influences on a system. According to Jackson (2009), "systems thinkers determined to exploit the 'inside track' to knowledge of human and social systems" (p. S28) pursue this framework. Further, Jackson (2009) suggested that "the soft systems approaches of Ackoff, Churchman and Checkland are labelled 'interpretive' because instead of trying to build systems models of the world they seek to work with different interpretations of reality" (p. S29). The interpretive approach is where much of the methodological use from a practitioner perspective seems to be. Rethinking activities guided by soft system methodologies appears to build capacity to improve systems through active learning experiences, focusing on interpreting results and applying them. It has been suggested that this "compare and contrast aspect of systems thinking contextualizes individually held workplace knowledge" so that it can be shared more easily (Davis & Somerville, 2006, p. 138).

Linking Values and Cognition to Systems Thinking

Understanding systems thinking frameworks, the mental models they create, and cultural interaction is key to understanding a system and its behavior. When planning support or interventions for a system, one must understand the implications of the dynamic interactions between culture, cognition, and individuals.

An analysis of culture suggests that one must review artifacts, underlying assumptions, or espoused beliefs of the system to begin 'construction' of the system in thought. In attempts to understand the system, mental models and cognitive bias play an important role in determining both the boundaries and state of the perceived system. Each 'observer' constructs the view of the system, and it would follow that to determine a

system's desired state or organizational values, one would have to look at espoused beliefs or vision/mission statements, which would represent a functionalist view.

To understand the current state of a system, a researcher should review artifacts (to elicit the culture aspect or, in this case, organizational values), key mechanisms, and structures using structuralist systems thinking. Support for the linkage of structure with systems thinking is provided by other definitional statements; for example, Parent et al. (2007) indicated that "a system is a mental model or mix of parts that interact with each other within the system's boundaries (form, structure, organization) to function" (p. 84). Soft systems methodologies using models and inquiry about perceptions may prove particularly useful in these types of situations, but the largest benefit would be in the interpretive areas of systems thinking.

Friedman (2004) made a connection with mental models and perceived states that also may provide a linkage with the suggested structural interactions or influences. He attempted to understand the causes of ineffective decisions based on perseverance of beliefs, emotions, mental models, and cognitive bias and ultimately suggested alternatives for improve thinking, such as role-play and critical thinking skills (Friedman, 2004). His literature review of cognitive bias, mental models, schemata, emotions, and misperception of dynamic feedback resulted in the development of a series of before and after questions relative to the state of a perceived system (present understanding) versus the current state of the system. The gap analysis process might more effectively generate system interventions. This approach seems to support the idea that an extensive list of training courses is not the sole answer to developing capacity for systems thinking and

that culture has more of a hold in more mature organizations and may have more influence (Hebel, 2007).

Additional support for cognitive and culture impacts on systems thinking is provided in research that emphasizes placing knowledge management in the larger context of systems thinking so that influencing factors can be better recognized and understood (Rubenstein-Montano et al., 2001). However, the same research also indicated that "frameworks are not consistent with systems thinking in that they're prescriptive (center on tasks), they do not address double loop learning and feedback, and that people and culture are typically neglected in frameworks" (Rubenstein-Montano et al., 2001, p. 7).

Minati (2007) suggested that systems are observer dependent (constructed) and represent a subjectivist view of the system. Multiple modeling methods would be helpful in "not generating observer points of views but in developing system existence and understanding" (Minati, 2007, p. 484). This would suggest that cognition and mental models influence systems thinking and that soft systems methodologies may be appropriate for discovering system views. Other research aligns with this view by suggesting reflection rather than prestructured research (Hebel, 2007). Further, Davidz (2006) addressed aspects that may improve systems thinking. She noted that Zulauf (1995) showed significant correlations between performance on system thinking tasks and a variety of variables, including cognitive complexity, internal locus of control, occupational level, educational level, and interest. Davidz (2006) also cited evidence suggesting that individuals "who can cognitively handle more complexity may also be more prone to high quality systems thinking" (Hirschi & Frey, 2002, as cited by Davidz,

2006, p. 48) and commented that “more work experience may contribute to the level of understanding systems” (Davidz, 2006, p. 49).

Environmental Factors Within the Theory

This section discusses systems and structuration as environmental factors relevant to the operationalized social cognitive theory model used for this study.

Systems

The concept of a system that exists within a particular environment is a foundation of systems theory, and what separates a system from its environment is the boundary or boundary conditions. Boundaries can be physical, mathematical, conceptual, or social (Mingers, 2010). Further, a system can have inputs, outputs, a transformative or transformational process, and a feedback loop (Katz & Kahn, 1966). System complexity can be considered in both detail and dynamics (Senge, 2006). Although the quantity of the parts may challenge an individual’s holistic system understanding, the “complexity lies in the nature of the interrelationships where cause and effect are highly nonlinear and distant in space and time” (Kim, 1993, p. 47).

Numerous definitions of system are found in practitioner literature, as summarized by Davidz (2006) in Table 2.2.

Table 2.2
Definitions of System

Source	Definition
International Council on Systems Engineering, 2004	"An integrated set of elements that accomplish a defined objective. These elements include products (hardware, software, firmware), processes, people, information, techniques, facilities, services, and other support elements."
National Aeronautics and Space Administration, 1995	"A system is a set of interrelated components which interact in an organized fashion toward a common purpose. The components of a system may be diverse, consisting of persons, organizations, procedures, software, equipment, and/or facilities."
Defense Acquisition University, 2001	"Simply stated, a system is an integrated composite of people, products, and processes that provide a capability to satisfy a stated need or objective."
Massachusetts Institute of Technology Engineering Systems Division, 2002	"A set of interacting components having well-defined (although possibly poorly understood) behavior or purpose; the concept is subjective in that what is a system to one person may not appear to be a system to another."

Note. Adapted from Davidz (2006, p. 30).

"Systems are not observer-independent, but rather observer-dependent in the sense that it is the observer which models a phenomenon as a system" (Minati, 2007, p. 481). This reinforces the notion that the way of thinking about a system or defining a system's boundaries is likely to be influenced by the observer of the system or the participant in the system. This notion also provides permeability for allowing culture or organizational values, cognition, and organizational structure to influence the observation. The question of whether or not the observer can 'see' all the parts, dynamics, and influences of the system under review remains and therefore the need for a capacity to sense dynamics and unexpected activity and place it within the context of the system for relatively quick adaptation or problem resolution. "Defense acquisition projects rank among the most complex of all projects due to the increased interdisciplinary requirements and the unique environment created by complex military

performance outcomes, incorporation of highly advanced technology and associated knowledge requirements, and the fact that they are public projects subject to public management and oversight" (Rendon & Snider, 2008, p. 13).

Structuration

Structuration theory began with Giddens (1979, 1984, 1993) and involves the "reconceptualization of individual versus society" (Berends, Boersma, & Weggeman, 2003, p. 1039) or social 'system' via the duality of agency and structure. Agency and structure are mutually dependent in praxis. "Practices are recurring and regularized actions of individuals situated within a social system that create and recreate that system" (Berends et al., 2003, p. 1040, in reference to Giddens, 1993). Therefore, structure exists as both a result of the actions of individuals and as the medium for their actions (Giddens, 1993, pp. 128-129). In representing these interactions, Giddens (1993) provided a model for clarifying the process of mediation of interactions and structure, as shown in Figure 2.7.

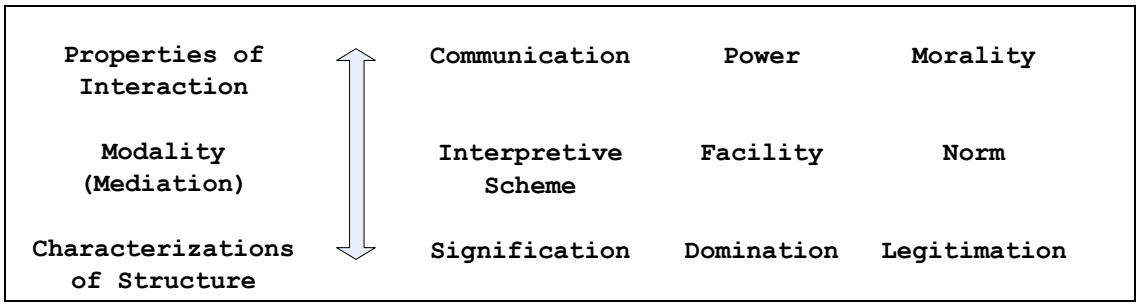

Figure 2.7. The duality of structure. Adapted from Giddens (1999, p. 129).

The communication property of interaction uses interpretive schemes to make sense of the semantic rules or cognitive order within the system while at the same time the conventions of the system are reconstituted (Giddens, 1993). Power interactions through the use of facilities drawn from hierarchy also reform domination of system resources to generate outcomes (Giddens, 1993). Morality in interaction through the application of norms drawn from the system's legitimized moral rules also serves to reconstitute the rules (Giddens, 1993). What's important here is not how to rearticulate or blindly follow a rule, such as may be required to perform a concrete task, but rather how to work with the system through application of relevant rules in varying contexts (Giddens, 1993). Senge (2006) reinforced this notion in stating that "structure includes how people make decisions—the operating policies whereby we translate perceptions, goals, rules and norms into actions" (p. 40). Senge (2006) also noted that "systemic structure is concerned with the key interrelationships that influence behavior over time and that because individuals are part of the structure we often have the power to alter structures but do not usually perceive that power" (p. 44). The recursive nature of structure and action provides dynamics within the system that need to be understood at varying points in time as well as with varying individual capabilities or motivations such as values.

The morphogenetic approach to structuration (Archer, 1995) provides a temporal dimension between structure and agency interaction, as shown in Figure 2.8. "The morphogenetic perspective maintains that structure and action operate over different time periods as structure predates the actions which transform it and structural elaboration necessarily post-dates those actions" (Archer, 1995, pp. 89-90). This approach is similar

to the temporal dynamics of triadic reciprocality within SCT (Bandura, 1986). The interacting effects of personal determinants, behavioral determinants, and the environment "will work their mutual effects sequentially over variable time courses," which enables analysis of relationships (Bandura, 1986, p. 25).

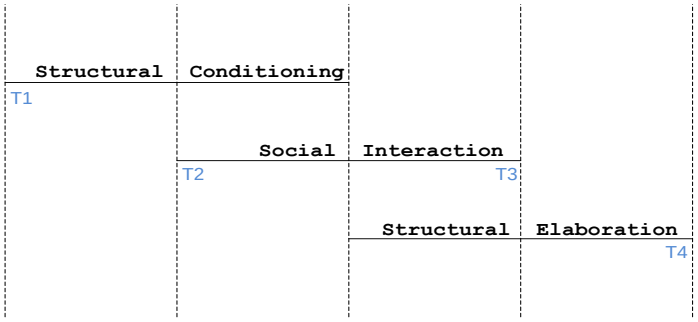

Figure 2.8. The morphogenetic sequence. Adapted from Archer (1995, p. 82).

Expanding on Giddens and Archer, Stones's (2005) strong structuration provided a quadripartite model that locates the agent in context and provides additional detail for sequential analysis. The model is recreated in Figure 2.9.

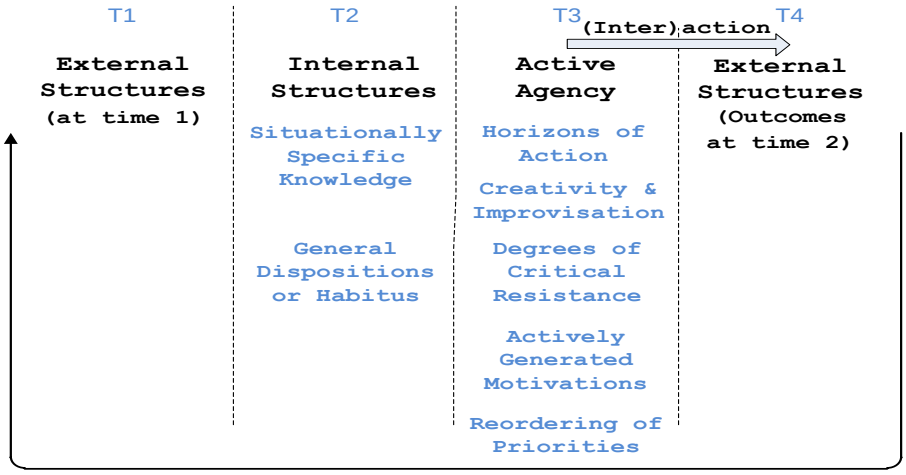

Figure 2.9. Stones' quadripartite model. Adapted from Stones (2005, p. 85).

While Archer provided a morphogenetic view or causal history approach to structuration and Stones provided additional detail on causal mechanisms, Elder-Vass (2010) added the construct of emergence to suggest that entities, having multiple causal powers and emergent properties, come together as a product of causal mechanisms and interactions in particular relations. As such, individuals' emergent causal powers are codetermined by the relational emergence between biological factors, reflexive thinking, and social structure that may alter our beliefs and dispositions for action dynamically (Elder-Vass, 2010). "Morphogenetic factors contribute to bringing about the existence of an entity in its current form and morphostatic factors are those that contribute to sustaining their existence over time" (Buckley, 1967, p. 58, as cited in Elder-Vass, 2010, p. 67). These causal factors lend themselves to helping to explain structural and functional forms of systems thinking, while understanding relational emergence might extend the structural range of understanding similar to that of more interpretive and dynamic systems thinking and resultant action by individuals.

Methodological Issues

In addition to the general lack of empiricism in the systems thinking conversation, literature suggests a need to investigate the influence of values and cognition or learning on the orientation for systems thinking at the individual level.

In one study, a tool was implemented in a high-tech organization to screen candidates for hire, training, and internal job placement (Frank, Zwikael, & Boasson, 2007). However, the resulting tool seems to be more similar to an interest inventory than a capacity assessment. There appears to be a need for a link that interest is related to self-

directed learning or improvement, as is suggested but not supported in current literature, so that the capacity issue is addressed more directly.

In many cases, it appeared that participants may have been influenced by explanations of systems thinking prior to taking the surveys. Additionally, many of the interviews reported in the literature reviewed involved systems engineers, whose daily tasks generally involve interacting in many functional areas and performing systems engineering functions and enterprise processes.

When attempting to delimit areas of study, it may be useful to select one of three levels (individual, team, organization) and one of three areas of culture to simplify data gathering and analysis for some of the following areas of suggested research.

Directions for Future Research

Some of the reviewed articles highlighted key directions for future research and suggested methodologies. As suggested by Parent et al. (2007), more verification and generalization, more precise identification of limits, and processes and mechanisms that sustain capacity are needed. This raises the questions: Do product-specific contexts create contextual social systems where knowledge boundaries are different? If systems definitions influence outcomes and the degree of system thinking is influenced, do systems need to be decomposed first?

As leadership, knowledge, and culture are called out as key to soft systems methodology, these can be investigated further with respect to the methods used to train leaders and transfer knowledge (Cavaleri & Reed, 2008). Additionally, does soft systems methodology create a sustainable workplace learning culture, and how do artifacts (culture) create a language for interpreting a system (Davis & Somerville, 2006)? Using

the chaos lens suggested by Eijnatten (2004), one might look at what effects in terms of culture cause an organization, individuals, or teams to move in different directions based on tensions in a system, and a comparison might be made using generative or sustainable organization literature to suggest different/modified constructs and suggest variables for measurement related to learning and complexity. Other questions that arise from reviewing the 'framework as an analysis method' questioning by Rubenstein-Montano et al. (2001) is whether or not double-loop learning is a necessity for systems thinkers and how the structure of knowledge management systems might influence systems thinking.

The systems engineering community has generated a multifunctional definition of systems thinking, along with 30 laws and seven facets of engineering systems thinking that may be applicable to other functional areas of work through research in another context (i.e., logistics) (Frank et al., 2007). One of the 30 laws relates to considering 'future logistics requirements' in product development phases—something I espouse and believe is not often practiced.

With respect to studies in different sized organizations, it would be interesting to compare small and large organizations to determine whether influences of culture, cognition, or structure lead to quicker and more obvious results—similar to how feedback is more immediate and visible on a small sailboat than on a large one. Also, it may be useful to gain an individual- or team-level understanding of system thinking as a precursor to organization-level or system-level understanding to build a micro foundation for more macro studies.

Lamb (2008) suggested that "no validated measures exist for systems thinking" and recommended study of "physical work environments (collocated, tactile vs not,

visualization aids), and frequency of team member engagement as influencers of collaborative systems thinking" (p. 6).

Summary and Implications

Popper suggested that "effectiveness in complex systems is changing the way problems are defined" (Cavaleri & Reed, 2008)—a statement that calls for a comparison to Kuhn. Much of the literature suggests systems thinking as a way to perceive patterns and interdependencies and add to already learned knowledge and behavior. The fact that systems thinking brings out "dialogue for boundary-crossing conversations" (Davis & Somerville, 2006, p. 129) might make it appropriate for organizational diagnosis and intervention cases. From a structuration and cognition perspective, reinforcement of the need for further study is evidenced by themes of systems thinking as a critical way of knowing and reflecting upon social and system structure. Ultimately, values and context complexity are brought into the systems thinking mix for consideration.

From a research perspective, many current conversations on social learning, individual values, structure, and complex systems were found. Based on this literature review, I suggest that integrative research into the cognition and structural influences on an individual's social learning is viable for contribution to both the systems community and the logistics community, with an opportunity to influence processes and performance outcomes that may be used in the areas for diagnosis and product development. The use of structuration theory might aid logisticians in "moving beyond variance theories to utilize more interpretivist frameworks and process theories that enable examination of the behavioral components of logistics" (Lewis & Suchan, 2003, p. 312).

CHAPTER 3:

METHODOLOGY

This chapter describes the qualitative case study methodology used to pursue the research objectives of this study. The study was developed to understand how an individual's experiences, as influenced by individual values, shape his or her behavior and actions within a complex system environment. My desire was to understand individuals during public-sector product development in order to understand how the operationalized variables 'shaped' the triadic dynamic relationship between an individual, other individuals, and the environment within a social cognitive theory (SCT) framework. Specifically, the study addressed one research question and two subquestions:

1. How do product support managers (PSMs) describe the dynamic social learning process as they develop and execute their responsibilities during the acquisition and production phases of a complex program?
    a. What effect do an individual's values and environment have in this social learning context?
    b. How do PSMs describe the changing nature of their social learning over time?

After a description of the logic for selecting case study methodology and the study's conceptual frame and constructs, the chapter describes procedures for site and participant selection and the collection and analysis of data, which included interviews and document analysis. The chapter closes by describing efforts to establish the strength of the qualitative methods and to address ethical concerns.

Research Design

Case Study Approach

A descriptive case study involving qualitative methods was used to describe relationships "in the context they occur" (Yin, 2009, p. 20) to answer the above research questions. The location of this research within the specific context of a public-sector acquisition program provided the boundaries for the case and also placed the research in context. The case study approach was also ideal for collection of detailed data with the purpose of embedded analysis (Yin, 2009) of the relationship between theories and constructs.

Case study is defined as a purposive, logical, in-depth investigation of a bounded system using multiple sources of data situated in a larger context over time, selected to maximize the opportunity to learn the phenomenon well (Creswell, 2013; McCaslin & Scott, 2003; Merriam, 2009; Smith, 1990; Stake, 1995; Yin, 2009). It results in operationalized rich descriptions relating particular and unique understandings of 'how,' 'what,' and 'why,' connected to supporting theoretical principles and propositions. While some phenomenological aspects were present in several interview questions that attempted to understand PSM experiences, the study was primarily framed around discovering the dynamic processes of how participants socially learn while balancing the negotiation of structure and values in complex systems. In studying these "complex phenomena within their context," case study is the most appropriate approach (Baxter & Jack, 2008, p. 544).

This study examined the relationships between an individual's personal determinants (delimited to experience and values), their behavioral determinants, and the

environment to understand how each shapes the individual within a complex environment. Case study is an especially appropriate fit for understanding how values and cognitive capacity affect individuals and their systems thinking ability within a bounded context of public-sector product and support acquisition. The case was further bounded by desiring to understand a particular set of individuals (logisticians) within a particular role (PSM or middle management) in acquisition programs varying in overall complexity. Overall, the research intended to represent the analysis in terms of a contextual case or cases of individuals.

Stake (1995) discussed intrinsic and instrumental cases. There is an intrinsic need to understand certain influences upon individuals within a given context to better understand behavior during product development, which is where the actions occur. Additionally, the program in question could be used as an instrument to understand cognitive influence/change during the program.

Social Constructionism and a Constructivist Epistemology

The assumptions of this study were shaped by the social constructionist philosophy. Social interaction is the central element of social constructionist philosophy. A focus on social interaction was necessary to address the purpose of the study in terms of understanding the recursive influences of the individual and environment on each other. For this study, social interaction was a significant element in understanding how an individual reflects and acts in a particular context. Social interaction provides a bridge between the system and the individual because they are both central elements to SCT and structuration theory.

Similarly, the study was guided by a constructivist epistemological perspective. I believe there are multiple realities dependent on context and that an individual's reality is both environmentally and socially constructed. There is no one right answer, as there are different answers at different points in time. While observers might be able to place some level of constraint in bounding and understanding a specific context, they are not likely to be able to capture the influence of all variables or all interpretations simultaneously.

Theory

As Yin (2009) suggested, "theory development as part of designing the case" (p. 35) is crucial. One theory in my research area is SCT (Bandura, 1986). It suggests that there is a triadic, dynamic, and reciprocal relationship between individuals, their behavior, and their environment (Wood & Bandura, 1989). This is an "individual theory," as characterized by Yin (2009, p. 37). Using this theory seemed to work well with the social situation 'type' case study of Gluckmann, as mentioned by Smith (1990, p. 130), to help reveal the general relationship of social learning in my selected context. As a dynamic and social adult learning theory, SCT is aligned with my social constructivist orientation (DeMarrais & LeCompte, 1999, p. 21).

Using SCT theory in my case study seemed to closely align with Smith's (1990) description of logic for "assisting with claims to validity and nature of explanations" (p. 130). In the same light, the use of the theory also presents a potential issue. Using this theoretical perspective to view the relationships between individuals' cognitive attributes (Jaques, 1986), their orientation toward applied systems thinking (Jackson, 2009), and the environment may bias and limit findings as well as any observations, as described by Eisenhardt (1989).

Using SCT along with other supporting theories in this study provided a conceptual framework, or a logical and plausible relationship (Smith, 1990, p. 128), between the variables I operationalized within that framework and provided explanatory power (p. 129). SCT also helped me look for patterns in the interactions between persons and their environment, similar to that suggested by Eckstein's "disciplined configurative" category of case study (Smith, 1990, p. 130). The theory also helped me bound my case study by providing support for a certain number of questions oriented toward my purpose, as mentioned by Hammersley (1995, p. 60). More succinctly, it helped me organize my thoughts and inquiry (DeMarrais & LeCompte, 1999, p. 4). Lastly, using the product orientation discussed by Hammersley (1995, p. 62), my case study provided a "description" using theory as an explanation for the connectedness of my suggested variables.

Context of the Study

Merriam (2009) suggested that research topics often "come from observing and asking questions about your everyday activities, literature, or from theory" (pp. 57-58). In this case, my topic arose from each area. My desire to understand individuals during public-sector product development came from experiences working on aerospace development programs. The literature also indicated some potential solutions via systems thinking, but much of the literature did not address either individual performance within a system or value influences on individuals. Lastly, there seemed to be a lack of application of theories such as SCT within my particular context.

Merriam (2009) suggested a problem is a "matter involving doubt, uncertainty or difficulty" (p. 58). Additionally, she indicated there are three components to a problem

statement (p. 61). The first component of 'context' is addressed by this study with the minimal evidence-in-depth that exists for supporting the influencing linkages of experience and values with systems thinking, particularly in logistics system contexts. The second component or "gap in the knowledge base" (Merriam, 2009, p. 61) is a lack of understanding of the potential application, based on an individual's understanding (Jaques, 1986), of certain systems thinking frameworks (e.g., interpretive, functional, structural; Jackson, 2009) or "systems of significant symbols" (Geertz, 1973) within complex defense systems; most references to structure influences on resulting behavior within the systems thinking literature offer only a cursory analysis rather than an in-depth view of organizational and individual values and experience as they moderate systems thinking practice or behavior.

Site Selection

The study focused on individuals (i.e., PSMs) in public-sector acquisition programs. The site selected was the Naval Air Station in Patuxent River, Maryland, based upon access to multiple, expansive, complex product development programs. A typical aerospace program office contains 100 to 200 employees divided into various product or functional areas. There are multiple programs of varying acquisition category levels at the Naval Air Systems Command. A public-sector site was believed to present more opportunities because of the more complex system with significant structure, compared with a commercial supply chain in the private sector. The naval aviation acquisition PSM community follows the requisite Department of Defense (DoD) acquisition guidance and is representative of and a part of the broader DoD acquisition community. In addition, the

naval aviation acquisition PSM community was familiar and accessible to me. Access to the site was granted.

Participant Selection

The participants were PSMs involved in new product and support system development. Selection was based on support function, roles, responsibilities, experience, extended access, and leadership recommendations. Sample selection also ensured that there were ample opportunities to observe different artifacts and symbols relative to a program's (system) structural influences. In keeping with a more inductive approach, I used purposeful sampling that typified my context and selected information-rich cases or individuals (Merriam, 2009).

Referral sources. I approached the Senior Executive Service government personnel who lead and manage the PSM community/occupational field within the Naval Air Systems Command at Patuxent River, Maryland. These individuals supervise product support management for the entire command and sourced PSMs for multiple program management offices. They were each asked to identify 8 to 12 candidates for this study who best met the selection criteria, with half coming from acquisition category (ACAT) I or ID (larger and more complex) and half coming from all other acquisition categories (less complex); they were also asked to provide the names in rank order of most experienced to least experienced (see Appendix A). They identified nine participants.

The Senior Executive Service individuals were competitively selected for their positions based on their experience in one or more program office management positions and their expertise in the acquisition logistics/product support process. They were

uniquely positioned to identify the participants for this study, since by the nature of their positions they are required to develop and manage the PSM community.

Selection criteria. The individuals were all acquisition logisticians (but also supported production and sustainment programs within the same program office), since that is the culture-sharing group of interest. These individuals were selected over other functional areas such as systems engineers, engineers, or program managers since these types of people require longer range and more integrative systems thinking perspectives that span both acquisition and sustainment of a product. To participate in the study, PSMs identified by the referral sources had to meet two specific criteria:

1. Have at least 2 years of experience in a PSM or equivalent role and be currently serving in a PSM role within a program office. This level ensured that individuals had the opportunity to participate within a program long enough to be engaged in a significant portion of the processes and were able to adequately describe how they accomplished their work.
2. Operate in a range of acquisition categories. This created variation in project size and complexity.

The selected participants had a range of 2 to 11.5 years as a PSM with extensive experience in other roles prior to that, which provided variation in experience.

Data Collection

Seidman (2006) suggested "in-depth interviewing as a way to understand the lived experience of other people" (p. 9) and a means to "put behavior in context and provide access to understanding their action" (p. 10). Interviews were particularly useful for this study to gain insight into participants' behavior and interactions within a complex

environment. While semistructured interviews (Merriam, 2009) were used to provide grounding in the PSM's responsibilities and activities, I asked open-ended questions to "establish the territory to be explored while allowing the participant to take any direction he or she wanted without presuming the answer" (Seidman, 2006, p. 84). Documentation such as organizational charts and resumes was also provided as sources of evidence (Yin, 2009) that complemented the in-depth interviews. I collected data until I had enough confirmatory evidence (Yin, 2009, p. 100) to support an understanding of my primary research question and two research subquestions.

Interviews

The Seidman (2006) phenomenological interviewing technique was used. This method "applied to a sample of participants who all experience similar structural and social conditions provides enormous power to the stories of a relatively few participants" (Seidman, 2006, p. 55). The technique requires three interviews of approximately 90 minutes each. The first interview was used to build rapport with each participant, review the purpose of the study, and provide an overview of the process. Additionally, I requested and received a resume describing the participant's background and organizations where he worked as well as any information regarding the program's current internal and external organizational structure. The second interview was used to gain information about the participant's past and context and understand the dynamic social learning process as he developed and executed options during the acquisition or production phases of a complex program. The third interview provided an opportunity to elicit reflection by obtaining feedback on the transcription from the second interview as

well as obtain clarification or determine if there were any additional thoughts or events the participant wanted to discuss.

Each interview used a protocol that included several open-ended interview questions. Since the "questions may change to learn more and engage the participant to elicit more of the participant's story" (Creswell, 2013, p. 47) and "each experience contains openings for further experience" (Moustakas, 1994, p. 55), follow-up probes were included in the protocol (see Appendix D). The questions were constructed based on the literature review for this study as well as the study's purpose and problem statements and examples provided in qualitative inquiry texts (Creswell, 2013; Moustakas, 1994; Seidman, 2006).

While Seidman (2006) suggested that the interviews be spaced from "3 days to a week apart to reflect on the preceding interviews but not enough time to lose connections between them" (p. 21), the duration and spacing of interviews were adjusted to accommodate participants' individual schedules. Some interviews were conducted more than a couple of weeks apart due to participant availability and to provide time for interview transcription, transcription review, and the generation of subsequent interview probes or clarifications. Interviewees were encouraged to take notes between interview sessions in a notebook I provided to capture ideas or further reflection on stories as they occurred to them. The notebooks were returned after the third interview, and none of the participants had drafted notes.

All interviews were digitally audio-recorded and transcribed by a professional transcriptionist before the next interview in the series was conducted. The transcriber was

required to sign a letter of confidentiality (Appendix C). Additionally, when possible I took notes during the interviews, which were useful in framing the next interviews.

Document Analysis

Document analysis primarily consisted of a review of participants' resumes describing their background and the organizations where they worked, as well as any information regarding their program's current internal and external organizational structure (i.e., organizational chart). Additionally, any clarifying information, reflections, and further detail provided by participants during the interviews was reviewed (i.e., basic program information).

Data Management

The transcripts of each interview, along with any available researcher notes and participant-provided documents, were read in their entirety to understand the complete context of the data (Creswell, 2013). Additionally, I checked the transcripts against the notes and recordings taken during the interviews to check for accuracy and completeness and to fill in any gaps that may have occurred due to recording difficulties. During this review, I clarified terms and acronyms as needed. Transcripts were shared with participants via e-mail or in hard copy for data validation. Codes, rather than the names, were used to identify participants to protect their confidentiality, and no classified information was discussed.

Data Analysis

Preliminary data analysis was conducted as transcripts were received to ensure responses were complete enough to comprehend answers. In-depth analysis commenced

once all interviews were completed, as recommended by Seidman (2006). The case study and analysis approach, as suggested by Creswell (2013, p. 199) and depicted in Figure 3.1, was used as a guide for this study.

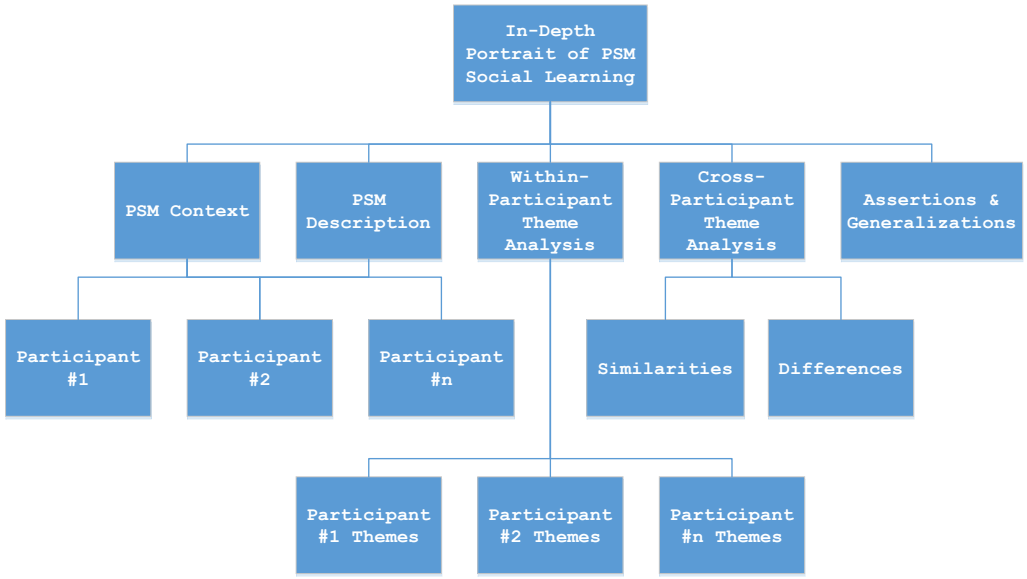

Figure 3.1. Template for coding case studies (adapted from Creswell, 2013, p. 209).

The following steps were followed as an appropriate order of analysis to assess the social learning experiences of the participants.

1. I read the first two sets of interview transcripts, highlighting statements that were significant and salient with respect to the research question as a form of initial structural coding. This task involved several readings of the transcripts along with a review of my notes and the supporting documentation provided by the participants. Each significant statement was coded and peer code-checked using this initial top-down set of structural codes oriented toward the research questions.

2. I compiled the codes from the first two full sets of interviews into an initial codebook and then coalesced them, based on common characteristics and similarity, into a second reduced set of structural codes. The chair reviewed the first two full sets of interviews and the codes, and the codes were peer-checked again before I coded the rest of the interviews.

3. I coded the remaining individual transcripts by utilizing the first-cycle structural codes (identified in Appendix F). I identified and highlighted the important and salient statements and then applied the codes in the codebook. This structural coding process "both coded and initially categorized the data to examine commonalities, differences, and relationships," as described by Saldana (2016, p. 98). During the coding process, aspects or potential subcodes began to emerge that were considered unique, significant, and salient with respect to the research questions and the literature. Subsequently, more than 1300 items were coded. They were discussed with the chair and peer, placed in Atlas.ti, and applied during subsequent coding.

4. I began to group the coded items into emerging subcodes utilizing pattern and theoretical second-cycle coding approaches (Saldana, 2016) from the bottom up (see Appendix F), resulting in identification of role aspects, environmental aspects, value aspects, and structural interactions aspects (as examples).

5. I transferred the interview transcriptions along with their highlighted statements and associated codes into Atlas.ti to help organize and analyze the research data.

6. Using the verbatim transcripts and codes, I developed themes to further surface unique characteristics, as well as common characteristics and emergent patterns and relationships across the participants.

7. I further analyzed and synthesized themes into the integrated composite descriptions of the contextual profiles and social learning profiles of the participants to provide in-depth descriptions. This analysis and synthesis provided a universal description of the PSMs' experiences that was representative of the group as a whole.

8. I interpreted the research findings relative to the existing literature. I developed conclusions along with recommendations for theory, future research, and practice. The research findings were reviewed and approved by the committee.

Strength of Methods

Trustworthiness and Validity

The primary research question and two subquestions related to the dynamics between each leg of the triad in SCT. Strategies of extended fieldwork (Johnson, 1997) helped validate the dynamic triadic interaction expressed in SCT. Peer review (Johnson, 1997, p. 161) has been suggested as the most relevant strategy in terms of theoretical validity. The use of negative case sampling to assist with theoretical validity presented an interesting dilemma, as most of the literature has suggested that complexity and value influence individuals' systems thinking but have not addressed it via extensive empirical research, let alone in the negative sense. Since most systems thinking research actually suggests a 'connection,' it seemed especially challenging to use negative case sampling (Johnson, 1997, p. 161), although that is much more relevant for increasing validity. Pattern matching seemed relevant in my case and helped validate my operationalized variables early on.

To promote internal validity (Johnson, 1997, pp. 163-164), the above strategies were used, as well as method triangulation (Johnson, 1997, p. 161), with multiple data

collection methods used including interviews, document review, and observation. Reflexivity was of particular concern, as I have worked in this environment for many years. Participants provided feedback (Johnson, 1997, p. 161), in part through member checking of transcripts. In addition, other individuals within the context organization as well as other levels of management within the organization reviewed my interpretations to validate my interpretations of not only the influence of values but also the values themselves.

From the perspective of external validity (Johnson, 1997, pp. 164-165), I believe that the interactions (based on SCT) may be generalizable to any product development context. Therefore, I documented in detail the number and kinds of participants, selection processes, environmental conditions during observation, and my relationships to provide better 'naturalistic generalization' (Johnson, 1997, p. 161) validity for the study and to facilitate a 'replication logic' validity strategy.

Based on some of Lincoln's (2002) quality criteria not alluded to earlier (e.g., reflexivity and reciprocity), evaluation of positionality (p. 333) was important during the research, as it potentially pertained to the review of organizational documents relevant to the description and evaluation of values. None of the organizational charts provided indicated value preferences other than being organized by functional and product areas. Positionality was, however, useful to consider when discussing observations of participants. The notion of community (Lincoln, 2002) comes into play while trying to contribute to the logistics and acquisition areas while at the same time satisfying the rigor necessary to the scholarly community.

As suggested by Krefting (1991), the truth value of my study was enhanced by careful selection of participants and the acquisition program, as well as by ensuring that

observational influences on participants were fully accounted for. Applicability (Krefting, 1991) was enhanced by conducting the study in an actual in-progress program (naturalistic setting) and thoroughly documenting conditions of and during the study for future use and evaluation as well as providing "dense background information" (p. 179).

Means of Ensuring Trustworthiness

Qualitative research methods establish trustworthiness by considering four criteria: credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985).

Credibility addresses the authenticity of the findings. In this study, credibility was enhanced by applying four procedures identified by Lincoln and Guba (1985):

1. *Prolonged engagement* (i.e., spending time with the participant): In this study, the engagement involved three lengthy interviews.
2. *Triangulation* (i.e., use of multiple sources): In this study, data were triangulated via interviews, documents, observations, and researcher notes.
3. *Member checks* (i.e., ensuring that participants agree with the data and interpretation): In this study, participants reviewed their interview transcripts.
4. *Peer debriefing* (i.e., to ensure accuracy and identify bias): In this study, a peer reviewed the pilot interview and first two interviews. The chair and committee members also reviewed the data collection and data analysis procedures.

Transferability refers to the relevance of the research findings for other contexts (Lincoln & Guba, 1985). Lincoln and Guba (1985) advised that transferability is best achieved via thick descriptions from which judgments can be made regarding whether the

findings are of value. For this study, rich descriptions were provided via transcribed interview quotes.

Dependability focuses on the inquiry process to ensure consistency over time and across methods (Miles, Huberman & Saldana, 2014). Dependability in the data collection phase was enhanced through overlapping methods: notes taken during interviews and the transcribed interview texts as well as participant review of transcripts prior to the following interview. Dependability in the data analysis phase was enhanced by peer and chair code-checking of the first two sets of interviews and the chair's review of the codes.

Confirmability was used to address the internal coherence of the study by grounding the study findings with the data, ensuring the logic of the data interfaces, and minimizing researcher bias (Lincoln & Guba, 1985). Lincoln and Guba recommended use of an audit trail. I maintained an activity log that that was used to ensure confirmability of this study.

Reduction of Researcher Bias

In the course of this study, efforts were made to understand the individuals' experiences for what they were, rather than what might be interpreted with researcher bias. Five approaches were used for this research to minimize researcher bias.

1. I reflected on the researcher's role and subjectivity to raise awareness and highlight potential bias. I have frequently experienced and shared the significant challenges of individuals, groups or work teams, and organizations to understand the complex relationships of their work areas to other work areas, a larger system, or an operating environment. Additionally, when provided a common purpose or outcome for a system, I have witnessed decision making that appeared to either favor individual,

subsystem-level outcomes over optimal higher system-level outcomes or failed to consider, due to lack of relevant schemas or organizational support, other product support design or support alternatives that may have been viable. This experience and understanding may serve well toward "asking good questions" (Yin, 2009, p. 69) but may also contribute toward bias (p. 72).

In trying to provide a service in my current role as a sustainment planning consultant for the government on aerospace development programs, I have a personal interest in developing personnel and products that help optimize product support solutions. I have also worked with several large aerospace firms in product and service development. Interviews in this area could potentially bring out bias similar to the "Community-Maintenance I" (trying to protect or align with peer industry or professional groups) or the "Non-research Human I" (in sympathizing with peers) as expressed by Peshkin (1988).

As a former U.S. Marine, I have experienced the frustration and fear of being in a situation that required top performance only to be disappointed. The results of the Marine experience may bring out something similar to both the "Ethnic-Maintenance I" (in terms of interviewing people that provide defense products) or the "Justice-Seeking I" (as some form of revenge for poor performance), similar to that expressed by Peshkin (1988).

As I am 54 years old, there may be some expression of bias against older or younger interview subjects. However, one of the best performing teams I ever led contained young engineers as well as experienced service members and industry logisticians. I come from a family with average education (no college) and was the first to obtain a college degree. This could have either led to sympathetic responses or aggressive

responses that disparage any aspect of educational background, but this topic did not come up during discussion (and was only evident in review of resumes).

In some respect, I have a positivist attitude in that I believe with enough work most anything can be accomplished or evaluated and solved. However, in later years, I have had more of a feeling that I must better understand people themselves and that not everything has a solution. I love to learn and would call myself a self-directed learner. This personal realization assisted with both "being a good listener" (Yin, 2009, p. 70) during interviews and with being able to adapt as better understanding was obtained in the process.

Based on the above, I think there were several obstacles to overcome before conducting interviews, which resulted in numerous iterations of the interview questions. I recognized the need to better explore personal experiences as related to the research.

2. A practice interview was conducted with one individual before proceeding to formal interviews of study participants. A peer reviewed the data from this interview, with a focus on identifying bias introduced by the researcher as well as the effectiveness of the questioning and probing. In addition, the chair reviewed the transcribed text of the practice interview to ensure that the questions were asked appropriately and were generating data that could answer the research question and subquestions. Improvements and additions were made in interview technique to ensure the narrative reflected the participants' own words.

3. I read Seidman's (2006) chapter 6 on interviewing before each interview to help reinforce the responsibility of remaining objective.

4. I made notes in a journal and reviewed them after each interview to clarify interpretations. From these notes, I developed a list of follow-up questions for each

participant in addition to reviewing previous discussions based on the participants' review of their transcripts. This helped minimize bias of interpretation and increased the focus on participant data. I reviewed the notes prior to each subsequent interview.

5. As part of data collection, the dissertation chair and peer checked transcripts of the first two sets of interviews to ensure that the questions were being asked appropriately and were generating data that answered the research question and subquestions.

Human Participants and Ethics Precautions

To ensure the safety and confidentiality of human participants and to address any ethical concerns, after the dissertation proposal defense the research proposal was submitted to the George Washington University institutional review board. After receiving this approval, the study was provided to the Naval Air Warfare Center–Aircraft Division institutional review board for further approval. The participants were not recruited and the study did not commence until these approvals were obtained.

To protect participants, all efforts were made to maintain their confidentiality. All participants were fully informed about the study before the interviews began (see Appendices B and E). They were informed that their participation was entirely voluntary and that they could withdraw from the study at any time. Participants were assigned a code to identify their transcripts, and only I knew the participants' true identities. In addition, any names or unique job or program titles mentioned by the participants during interviews were deleted from the transcripts. I stored transcripts and study files in a locked cabinet in my home and stored the key connecting participants to the code in a separate secured location. Study documents will be destroyed within 2 years of successful defense of the dissertation.

CHAPTER 4:

FINDINGS

This chapter describes the findings of a qualitative study involving nine participants who met the specified criteria. The findings were derived from 27 in-depth interviews (three with each participant) resulting in more than 30 hours of dialogue. The interviews were conducted over a 7-month period, followed by 6 months of data reduction, analysis, and synthesis of the resulting 774 pages of transcribed dialogue.

The study had a single research question with two subquestions:

1. How do product support managers (PSMs) describe the dynamic social learning process as they develop and execute their responsibilities during the acquisition and production phases of a complex program?
    a. What effect do an individual's values and environment have in this social learning context?
    b. How do PSMs describe the changing nature of their social learning?

The findings are presented in two forms: individual summarized profiles and major themes that emerged across the data. This presentation preserves the intent of understanding the individuals' social learning in their environment while also describing both similar and outlying features of social learning across participants. A summary of linkages between the research questions and codes is presented in Appendix F. In many instances, data obtained from specific interview questions revealed information pertaining to more than one research question.

This chapter is organized into four parts: (a) a description of the participants; (b) contextual profiles (which include salient comments regarding how participants describe

their role, environment, and values, including how they perceive those values relative to organizational values); (c) social learning profiles focusing on the dynamic interactions taking place (which include salient comments regarding their interactions during current projects; significant relationships PSMs identified outside the program or Naval Air Systems Command [NAVAIR], inside the program, and on their team; significant challenges experienced in their role and how they approached or came to resolve them; feedback; and how they describe future success); and (d) a summary of the themes that emerged from the research.

Description of the Participants

To participate in the study, individuals were referred by Senior Executive Service government personnel who led and managed the PSM community/occupational field within NAVAIR at Patuxent River, Maryland, and met two specific criteria: (1) they had at least 2 years of experience in a PSM or equivalent role and currently served in a PSM role within a program office; and (2) they operated in a range of acquisition categories. As indicated in Table 4.1, the participants' applicable experience as a PSM ranged from 2.0 to 11.5 years. Additionally, most participants had a prior mid-level logistics role that ranged from 1.5 to 14.0 years also within a program office. All but two of the participants had some experience in a higher echelon role such as assistant program executive officer (logistics) or in an organizational logistics competency support role. All of the participants had experience in other logistics-related roles, such as support services contractors, logistics element managers, or military service logisticians. All participants were Level III certified in life cycle logistics under the Defense Acquisition Workforce Improvement Act, and most were also certified Level II or Level III in other functional

areas such as test and evaluation or program management. Two-thirds of the participants had graduate degrees, and the remainder had at least an undergraduate degree.

For purposes of ensuring participant confidentiality in reporting findings, all participants are identified by number and are referred to in the male gender. The presentation of work experience data in Table 4.1 is arranged by length of tenure in a PSM or previously equivalent role and not by participant number. Differences in the participants' age, education, work experience, tenure as a PSM, gender, and work environments were considered throughout the analysis and synthesis of the data, and none of these factors was found to directly affect themes. However, some of the participants' common experiences with the researcher did appear to influence the amount of slang used in describing their experiences.

Table 4.1
Selected Work Experience Data of Participants

	Years of experience					
PSM	PSM/ DOL	APML/ DAPML level	APEO(L) or higher level	Competency	Other logistics area	Prior military
4	11.5	10.0	0.0	2.0	8.0	8.0
7	11.0	0.0	0.0	0.0	0.0	28.0
5	5.8	14.0	1.2	2.0	3.0	4.0
2	5.0	5.8	0.0	5.0	5.0	0.0
3	4.1	8.7	0.0	2.8	0.6	20.5
6	4.0	6.0	0.0	0.5	7.0	29.0
8	4.0	5.5	0.0	0.0	9.0	0.0
9	4.0	1.5	0.5	0.0	15.0	23.0
1	2.0	11.3	4.0	2.2	9.3	0.0

Note. PSM/DOL indicates product support manager/director of logistics (current and previous roles); APML, assistant program manager for logistics; DAPML; deputy assistant program manager for logistics; APEO(L), assistant program executive officer for logistics; Competency refers to a functional area competency within NAVAIR (e.g. 1.0 for program management or 6.0 for logistics).

Contextual Profiles

This section describes findings related to the role of the PSM, the environment they operate in, and their values (including aspects of why they remain in their job and whether they felt that the organization shared those values). Within each area, findings have been developed into key elements or themes based on analysis of the interview transcripts. Variation within each theme is described, and salient comments are provided to highlight variation.

The Product Support Manager Role

PSMs described their role as being one of developing the team, being the lead logistician or subject matter expert, providing guidance to the program manager, and developing product support strategy.

Descriptions related to developing the team varied from directly guiding the team in "providing them [logisticians on the team] guidance and oversight of what they plan to do" (PSM-8) or in being "the strategic visionary providing guidance and direction to individual deputy APMLs [assistant program manager for logistics] in both acquisition and sustainment" (PSM-4) to acting as a filter and interface between others and their team during the course of their work:

> I provide the top cover, right, whether that means shielding them from barrages of data calls or trying to simplify it. I'm outward facing to the competency [i.e., the logistics voice of the program to larger external NAVAIR functional area leads] and upward facing to the program manager and deputy program manager . . . on a day-to-day basis where they're [logistics team members] managing the 12 product support elements for their system or their components. (PSM-2)

PSM-3 emphasized team development over codified responsibilities:

> However, I view it as much greater than that [developing strategy]. I'd put a lot of emphasis on the person who's responsible for building an organization and building a team. It's not just [Section] 2337 that talks about develop—those are just *things* [emphasis by participant]. Product support agreements and providers and strategies are things, but they're not an organization. They don't live and they don't breathe and they don't perform and the people that give you those strategies and the ideas and providers and—those are the people, that's the organization. (PSM-3)

Descriptions related to being the lead logistician or subject matter expert for logistics varied from being the "program manager's voice . . . and conscience . . . for logistics" (PSM-4), "program manager and logistician rolled into one" (PSM-9), or "caretaker of products" (PSM-1) to being the interpreter for others to "ensure team members understand the user environment" (PSM-1).

Descriptions related to providing guidance to the program manager varied from that of "keeping the PM [program manager] out of trouble, make sure he understands what he's supposed to be doing, to keep to that sustainment of this airplane" and providing guidance to support "his abilities to fund those [sustainment] requirements" (PSM-6) to "giving them information on best practices so that the weapon systems that we bring into inventory are supportable, sustainable throughout the life cycle" (PSM-8).

Descriptions related to developing product support strategy varied from directly identifying it as a codified responsibility (PSM-3 and PSM-5) to being the "strategic visionary" (PSM-4) or "engaged in strategic solutions that we'll require to impact/benefit readiness or impact cost per flight hour" (PSM-7).

While all of the participants were aware of their responsibilities codified in U.S. Code Title 10, Section 2337 (Appendix G), five participants described their role directly in terms of one of those responsibilities (strategy). One of those four acknowledged the responsibilities under the law but emphasized that his view of the role was more to lead

and develop the team. Four of the participants described their role as one of developing or providing guidance to their logistics team within the program. Each of those four also described additional roles of being the lead logistician/subject matter expert for logistics or providing guidance to the program manager or developing product support strategy. In one case a participant described all four views of the role. A summary of role(s) described by participant is depicted in Figure 4.1.

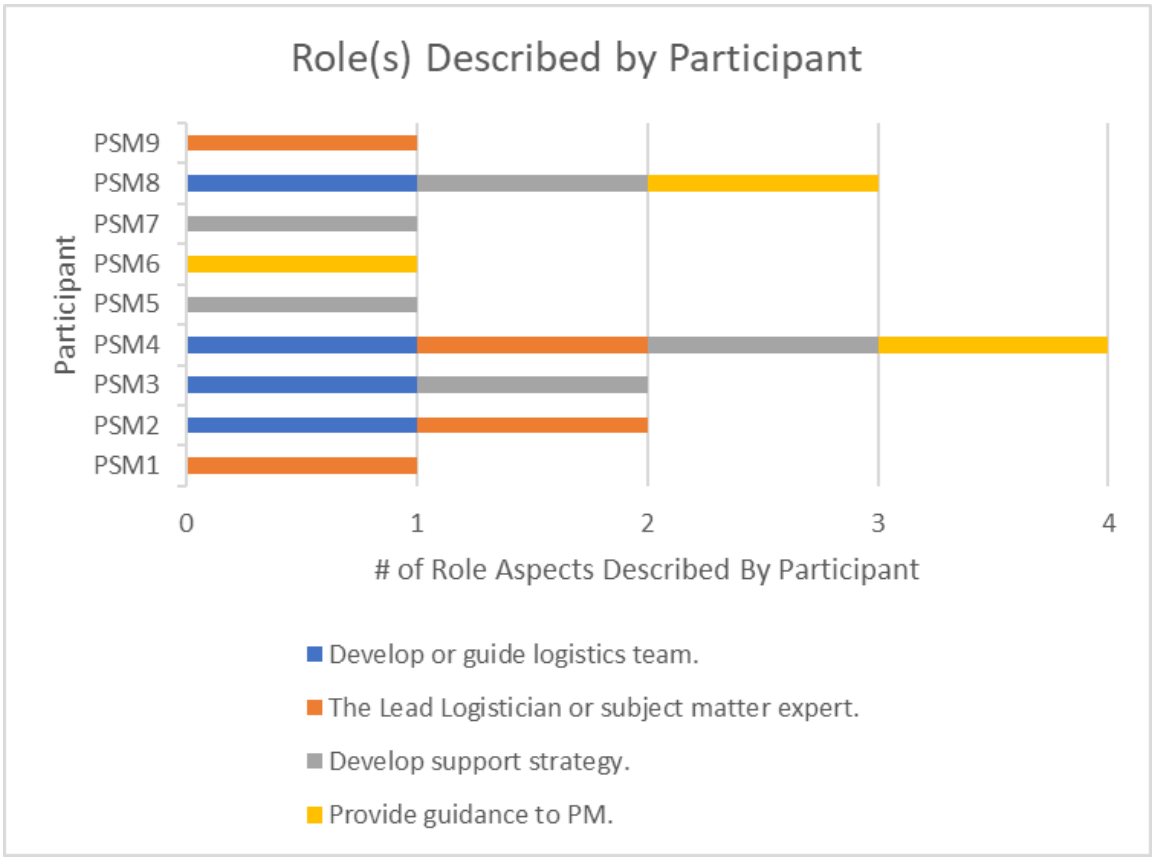

Figure 4.1. Participants' descriptions of product support manager roles.

In summary, while PSMs closely associated their role with responsibilities codified in law, they placed significant emphasis on their role being the development of others as the functional or lead expert in logistics.

The Product Support Manager Environment

PSMs described their environment in diverse ways through direct questioning regarding their current environment as well as through their stories relating current projects and interactions. As a result, more than 100 cases of environmental codes were identified and grouped into nine aspects. However, the number of aspects across participants varied considerably.

All of the participants described their environment in terms of being complex, dynamic, and uniquely executed. However, the characterization varied considerably. Representations included those that influenced progress, changing plans and schedule, increasingly complex products or life cycles, differences between process and execution, quantity and frequency of change in relationships, dynamic task demands and priorities, and in one case a living organism—"this is a living, breathing animal out here" (PSM-3). Representative variation in descriptions of the complex, dynamic, and uniquely executed aspects of the environment are summarized in Table 4.2.

Table 4.2
Descriptions of the Environment as Complex, Dynamic, and Uniquely Executed

Characterization	Representative quote
Logistics reactive to requirements and change, with progress measured in the short term	• You know it's every day, that's the beauty of our job, it's never the same. Every day I come in, you measure yourself with those little successes and actually generate and make those needles move the direction the leadership wants it to move. (PSM-4) • The operation requirements move faster than the big wheel of the government, so sometimes when they want to do stuff that logistics trail, to follow it, to support it is so far behind it and by the time they're done with that they're off to a new thing and you're just getting here. (PSM-6) • The unfortunate thing is that I'm reactionary so within NAE [Naval Aviation Enterprise] we talk about the word "future readiness." It's real hard to look over the horizon and support a decision early on. A new requirement comes out, we're reacting to it. We do a lot of that: "Hey, start doing some planning because this might come down," but even at the planning phase we're reacting to it. (PSM-8)
Frequently changing plans and schedule	• I have a calendar; it's only as good as that Monday coming. I never know what my day is going to be like. I have my schedule. I have my list of things to do. . . . Well, it's still there and I haven't scratched one thing off today because I was doing other things. (PSM-5) • There's a lot of moving pieces to our strategy. (PSM-7)
Products that are complex and in various life cycle stages	• Pretty disappointing how much training we have to provide in that, you know, far too often we are expecting you know—you know, we're trying to have a nuclear power plant and our solution is, "Well, we have to have freaking Einstein figure this shit out on the fly every day and wonder why it doesn't work." (PSM-1) • Life cycles of when any one individual system starts is completely different from another. (PSM-8)
Differences in processes and execution, which create unique conditions	• The challenge in a PSM job is that it's unique to you, right, no matter how—you say, "I'm a PSM and if I've gone through being a PSM for this program I should technically be transportable to any program," whether it's commodities or other platforms (rotary wing, fixed wing, weapon), but the day-to-day execution level tasking that's expected is unique to your program, whatever it is that you're working. (PSM-2) • We have more than 30 different program offices and more than 30 different ways of doing stuff. (PSM-3; similar quote from PSM-5)
Quantity and change in relationships	• It makes it very hard. It's very hard to try to figure out who are the right people [to interact with]. Do those right people have the basic knowledge of knowing what they're supposed to be doing, how they're supposed to be doing it? And by the time, I think, when you finally start working with people they're moving, and now you've got to start all over again, so it's really tough. By the time you get that relationship and you get them understanding, it's like, boom, they're gone. (PSM-6) • You go from the highly visible, everybody-wants-to-help-you program, which is the ACAT-1 [large acquisition], down to the full sustainment that nobody wants to help you. (PSM-9)
Varying task demands and priorities	• With ensuring all the product support elements are in place, and what comes with that, is just constant tasking, right? It's almost like we're on information overload. We get so much information and from so many different sources, and what's the information I really need to help me do my job? When you're in the position, you do what's required, and a lot of times what's required is driven by whom you work for, both in the program office and on the competency side, right? (PSM-2)

In summary, PSMs operated in complex, dynamic, and unique environments where logistics was reactive to changing requirements. Further, the highly dynamic nature of relationships, plans, schedules, and priorities created conditions where progress was measured in the short term and programs were uniquely executed.

Most participants also described their environment in the following ways: as resource constrained in terms of funding/budget, time, or qualified people; as functionally stove-piped, with limited control and the presence of conflict between roles; as learning through trial and error or learning as they go; and as receiving support and encouragement from leadership.

Funding constraints were described as being "focused on near-term problems and not understanding value of long-term investments" and not having "consistent funding to maintain [logistics infrastructure]" (PSM-4), as well as the reallocation of funds to other functional areas [nonlogistics] for "capability or schedule delays" (PSM-5). Time constraints were described as supporting "too many meetings" (PSM-5 and PSM-2), "responding to lots of data calls" (PSM-2), and "spending a lot of time at [remote] locations" (PSM-9) to interact with other team members. People constraints were described as not having a "deep bench" (within the competency to support the program) (PSM-7) and "limited people to address all the shortfalls and tasks" (PSM-1). Additional representative variation in descriptions of the resource constraints in the PSMs' environment is summarized in Table 4.3.

Table 4.3
Descriptions of Environmental Resource Constraints

Characterization	Representative quote
Lack of funding to accomplish responsibilities	Everything you're talking about there [pointing to a list of all logistics elements] takes money to do. You want to do predictive analysis; I've got to have a strong fleet support team and I have to have tools like obsolescence manager tools. I have to have a readiness cell who's looking at the vector model and projecting that long-term demand pattern. I don't have any money to do that. Leadership doesn't understand these basic principles. (PSM-4)
Lack of time and personnel to complete tasks	You know that there is so much to do, there's shortfalls everywhere. You know I am mindful of what they need to fight the fight and then you know decompose that down to what they need to help them fight the fight and just prioritize shortfalls and those gaps, and we've got a very limited team, you know, to be able to go and address these things. (PSM-1)
Other functional areas receiving prioritization for funding over logistics	Logistics is always the tail that always gets cut off because of funding. [Another functional area] used it all up, because of [schedule] slips or whatever, and by the time we get there it's just like: "Well, I had this [amount of money] for you, but we kind of used it in this [other functional area]. Now how can you wait longer or get it down the road?" (PSM-5)
Highly variable funding	You've got to be flexible because things change so much. You can come in one day and you've got all kinds of money; you come in the next day and Congress has taken half your money but you've still got to deliver. (PSM-9)

In summary, PSMs operated in an environment where available funding and time to complete tasks were highly variable and constrained, focusing the PSMs on near-term priorities with limited availability of qualified personnel.

Not only were tasks and funding highly variable, but PSMs often had limited ability to control the funding made available and the prioritization of their work due to functional boundaries that created role ambiguity and role conflict. They noted functional stove-pipe descriptions related to divisions precluding the best outcome (PSM-9), the perception of logistics as trade space (PSM-8) or advisory in nature (PSM-7), and the lack of understanding by other functions (PSM-3 and PSM-7). Limited control and role conflict descriptions were related to no control over budgets (PSM-2 and PSM-4), task

management and prioritization (PSM-2 and PSM-9), and processes necessary to complete tasks (PSM-9). A summary of representative quotes is provided in Table 4.4.

Table 4.4
Descriptions of Role Control, Role Conflict, and Functional Constraints in the Environment

Characterization	Representative quote
Lack of control over budget creating role conflict with financial managers	You hold me accountable for nine different elements, . . . but those require funding and I manage zero funding in this office. The BFMs [budget and financial managers] truly manage that funding, tell you what you can and can't do, and that's not going to work. (PSM-4)
Lack of control over tasking	When you're in the position you do what's required, and a lot of times what's required is driven by whom you work for, both in the program office and on the competency side. (PSM-2)
Lack of understanding between competency and programs, which limits contribution	They [competency] is very isolated from what happens in programs. I think they're just disconnected from what we do. I should be able to look behind me and have somebody behind me. . . . Well, they're not there. (PSM-3)
Perception of logistics as trade space	I would say the biggest one is from the IPT [integrated product team] level. There seems to be two things. Logistics is easy, and logistics is my trade space. (PSM-8)
Lack of control over process to complete tasks	I like getting stuff done . . . but once you transition into a sustainment mode a lot of times you get the lawyers and contracts involved and they tell you you can't do what you want to do, and that gets frustrating. (PSM-9)
Competition between functions	If you look at the construct of the organization was set up originally, the lead logistician . . . was part of the program office and then we split into competencies where there's this 'competition' between them. (PSM-9)
Perception of logistics as an advisory function rather than necessary to execute	And then we've got IPTs [integrated product team leads] and from the PM [program manager] down through the IPTs is all execution; they're all 1.0 [program management] guys. Out here on the side is the functionals: I'm a functional, engineering is a functional. According to him we don't execute anything. (PSM-7)
Role ambiguity creating role conflict with stakeholders	[There's] not a solid understanding of the roles and responsibilities of a PSM. I think in most cases if you ask PSMs I would say that they have to force themselves to get engaged, not only within the program office but external to the program office with the stakeholders. (PSM-7)

In summary, PSMs operated in an environment where there was role ambiguity and conflict that effectively restricted understanding vertically and horizontally, as well as control over available resources.

Learning through trial and error or learning as you go was characterized by lack of training, training that was more heavily acquisition oriented over sustainment, and policy, guidebooks, and training that did not reflect the reality of program work. There was also confusion resulting from too much information from varied sources. A summary of representative quotes is provided in Table 4.5.

Table 4.5
Descriptions of Environmental Aspects of Learning

Characterization	Representative quote
Lack of training	Everybody out here is learning as they go. Our system is just not set up to train people to do the work they need to do. (PSM-3)
Training as heavily influenced by acquisition rather than sustainment	I do not have a playbook. We've been teaching acquisition for 25 years and not sustainment. In the end, there's no playbook for what we're getting ready to go into. (PSM-4)
Standard work packages that did not aid understanding under varying conditions	Standard work packages [in the past] weren't quite as cookie cutter as what the standard NAVAIR work package is today. It was more instructional on how to understand and how to proceed under varying conditions and inputs for each [logistics] element. (PSM-1)
Training and certification that did not reflect reality	Because in my mind the DAWIA [Defense Acquisition Workforce Improvement Act] certification and classes are utopia and nothing that we do here is utopia. Most of those classes don't really give you a good foundation of what to expect. (PSM-9)
Confusion on relevance of information needed	It's almost like we're on information overload. We get so much information and from so many different sources and what's the information I really need to help me do my job? (PSM-2)
Policy, position descriptions, and guidebooks that differ from executing within a program	There's position descriptions, there's the Product Support Manager Guidebook, there's the Title 10, right, that drives the requirement for a product support manager, there's all those things and then there's being in the program office and executing. And I think certainly they're tied but, at the same time, they're very different. (PSM-2)
Length of programs constraining complete understanding	It's very few programs that you come into and get it all the way to disposal, because I mean that takes 25 or 30 years just to do that, probably more, so you never see the full fruition of the thought that originated. (PSM-9)

In summary, even in a highly structured and regulated environment, PSMs experienced confusion and variation in meaning between their training and guidebooks and the reality of how they operated within programs.

Participants described support and encouragement from leadership as being able to "run free range" (PSM-1) and having a program manager who "listens" and engages the PSM to "provide input" (PSM-5) as well as shares "a common understanding of what [the PSM] needs to do" (PSM-6). They also described it in terms of "fostering good relationships with other program leaders" (PSM-2) and "sharing common goals" (PSM-6) with them, and as a "highly collaborative environment with other functions" within the program (PSM-8). While aspects in this area appeared to be incongruent with some of the previous descriptions of the environment, these responses were limited to other leaders and within the program.

A third of participants identified aspects of the environment as being highly structured or risk averse, not learning from mistakes, lack of trust, and lack of accountability. Representative descriptions related to structure or risk included "financial and contracting being risk averse and delaying [task] execution" (PSM-3), a "lot of guidance and policy" (PSM-2), and resistance to large change:

> You can't come in and say, "You need to shift a quantum amount over here to do it differently" and . . . you're say this to a group that is being funded to do a certain task. Everyone's happy with the task that they're doing and you know you're going to come in and tell them, "Risk your well-being; don't give them what they've always received; don't give them what they like." And then have all your funding cut and you'll be unemployed by next year, you know, so it's got to be an incremental thing and it's incremental enlightenment that they can take ownership of and jointly work forward with—you know, new levels of discovery. (PSM-1)

PSM-3 felt the structure provided by Title 10, Section 2337 was helpful to the organization even though it didn't solve their problems:

> I like it because it focused this organization. It focused the organization across all the different program offices and standardized the role of the PSM to that point that standardization did not exist. [Section] 2337 came out and it basically put

> "structure" into the role of the PSM. It basically said: Listen, we're going to hold one person accountable for sustainment, and it's going to be this guy. Now it doesn't solve the problem, but it makes it easier.

Representative descriptions related to not learning from mistakes included having "a culture of mediocrity and making the same mistakes over and over" (PSM-3), "learning from bad examples" (PSM-3), "not sharing knowledge because they don't listen anyway" (PSM-4), being too "invested in processes to consider change or streamlining" (PSM-1), and "developing additional processes instead of investigating why the old ones don't work and correcting them" (PSM-3).

Representative descriptions related to trust included a lack of trust between PSMs and competency leadership with "questioning success and not attributing it to PSM actions" (PSM-4), getting "too much help in high visibility ACAT-1 [large acquisition] programs" (PSM-5), having to "go through so many different chains of command or layers" (PSM-2), and "reviewing briefing information and then respond to questions and changes from multiple levels" (PSM-2).

Representative descriptions related to accountability included "having to correct the best you can for decisions that were made before" (PSM-2), agreements not followed through on where "you can go in there and say 'I need this' and it's always, 'well, I can make it up here'—of course, they never make it up over there" (PSM-1), and lack of performance:

> That's something I preach: You know, there's got to be responsibility. I've got responsibility; I want to be held accountable. Damn right, if I'm not doing my job you come fire me. And then consequences. It really is that, and you know I don't think there's a lot of that going on, you know, between internal NAVAIR to a certain extent, but then external through contractors. (PSM-3)

Figure 4.2 summarizes environmental code density by aspect, and Figure 4.3 summarizes environmental aspects described across the population of participants.

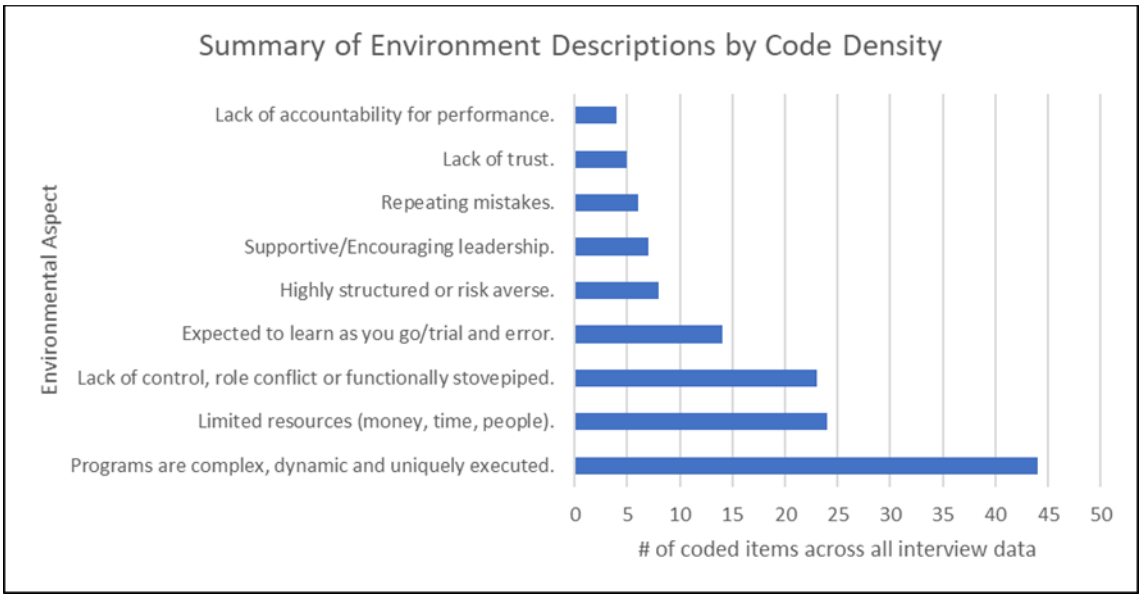

Figure 4.2. Summary of environmental aspect by code density.

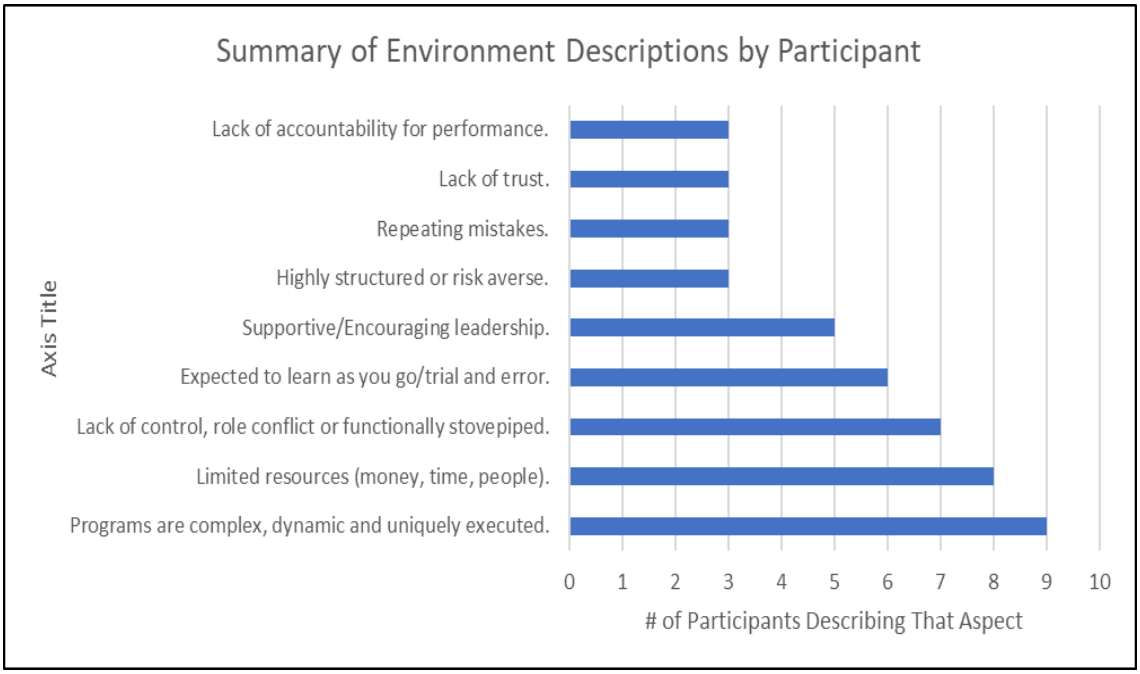

Figure 4.3. Environmental aspects described across the population of participants.

In summary, the complex environment described by PSMs was highly structured yet dynamic and was dependent on interaction with limited authority under conditions of highly variable resources, often resulting in learning by trial and error.

Product Support Manager Values

Participants were directly asked during Interview 3 to describe values that sustained them or held them together in their current environment. Additional value orientation descriptions were obtained by asking PSMs to discuss why they have stayed in the PSM job. Value orientations were developed in terms of their descriptions in each of the above areas and characterized using a simplified version of Schwartz's (1994) motivational value types and relations model. This was used to help characterize participant descriptions of values along two dimensions. One dimension "opposes values emphasizing acceptance of others as equals and concern for their welfare to those emphasizing the pursuit of one's own relative success and dominance over others" (Schwartz, 1994, p. 25). This dimension was simplified into orientations related to helping or developing others versus personal achievement and control. The second dimension "opposes values emphasizing own independent thought and action and favoring change to those emphasizing submissive self-restriction, preservation of traditional practices, and protection of stability" (Schwartz, 1994, p. 25). This dimension was further simplified into orientations relative to independent thought and action versus preservation of practice and conformity. Lastly, participants were asked if they felt the organization shared their values.

All participants described value aspects related to helping others. Characterizations varied from helping the fleet (user) or conserving their resources to

developing subordinates or prioritizing them over time to complete tasks or achieving a good outcome. Aspects described in this area included "commitment to [improve conditions] for the fleet every day" (PSM-8 and PSM-9) as well as "developing subordinates" (PSM-5) "through direct interaction and involvement with projects" (PSM-7) to "help them succeed" as well as "improve their understanding of tasks to appreciate the value" (PSM-2) or "understand how [logistics documents and processes] help them in what they do" (PSM-9). A summary of representative quotes with value orientations characterized as helping and developing others is depicted in Table 4.6.

Table 4.6
Value Orientations Related to Helping and Developing Others

Characterization	Representative quote
Developing team	• They [extensive briefings] keep me from changing cultures and building discipline and hiring the right people and focusing on their work life and work quality and having them have the job satisfaction. (PSM-3) • Really focus on what's important and how we build up the skill sets within our folks so that they are knowledgeable enough that when you empower them the right outcome is achieved. That's the real challenge. (PSM-1) • In order to be successful as an organization you have to have individuals who are individually successful and you have to have people that are happy to do their work. There has to be clarity in what it is that they need to do. The outcome or the success is less important to me than all of the things that go into making that success happen. (PSM-3) • I can do this or is it a training opportunity that may take me a little bit longer, but it in the long run I have 15 people trained, right, and then they get enough to get their feet wet but then over time do it more and more repetition, then they get the experience, the level that they need to get out of the journey level up to more of the expert level type stuff. (PSM-5)
Improving user conditions	• We're all here for the kid out there maintaining the aircraft and of course the pilots that are flying them. (PSM-5) • Yes, so the main thing is I hold true to—if it's something that's got to be done, a product to get to the fleet, I've got to look at that. And I will not—I will not accept nonsustainment. In other words, I will not put it out there with some sustainment in place if it's not the full package that can support the operation, the maintenance of that system. (PSM-6)
Improving user conditions and developing team	• Success and improving readiness for naval aviation starts with the people. We've got to make the people here better at what they do. (PSM-3)

In summary, participants valued helping others in order to achieve the goal of providing increased levels of operational readiness. Often in support of this, participants valued developing others to achieve a better understanding of their tasks, a recognition of the value of their contributions, and professional knowledge in order to help them be successful. This orientation also closely aligns with aspects of the descriptions of their role to develop their logistics team and serve as subject matter experts.

Opposing value characterizations in the same dimension related to personal success or achievement, power, and control. Descriptions of achievement included "achieving something on a daily basis keeps you from quitting" (PSM-9), "seeing forward momentum is what sustains you" (PSM-8), and "I can't afford to fail in these day-to-day things that have to get done" (PSM-3). Descriptions of power and control included "information is power" and "I care about how I'm doing and in essence, . . . the customer is the program office" (PSM-2). A summary of other representative quotes is depicted in Table 4.7.

Table 4.7
Value Orientations Related to Personal Achievement and Control

Characterization	Representative quote
Achievement	• Well, I mean specific to the [performance contract] I'm holding to—I've been pressured to expand the [particular contract]. Awarding a [small] contract is better than no contract at all. (PSM-7) • I'll take a tie or a win and you've got to be willing to take the tie where they [a commercial vendor] didn't really win anything but didn't lose and I didn't win anything and didn't lose. It's truly a case by case and you tailor it by the scenario, whatever it is. (PSM-4) • Well, I'll tell you for me, you do have to be able to survive. It's very difficult on a day-to-day basis. You know those demands are going to be there so it's—at some level, you do have to focus on winning those engagements so you have to create some kind of a rhythm and some kind of an environment within the team that you can get the work done that needs to get done while you're working on fixing all these different things. (PSM-3)
Achievement and control	• I'm pretty committed to the type of leader that I am and, you know, the type of organizations that I run. I don't generally turn my back on those commitments just because there's heat under me to get something done. (PSM-3) • I like getting stuff done and I like being able to "hey, let's do this, let's do that," but once you transition into a sustainment mode, a lot of times you get the lawyers and contracts involved and they tell you you can't do what you want to do. (PSM-9)
Control	• What I try to convey is even if you're going out and you're bringing in the subject matter experts, make sure you're the one that's staying on top of the outcomes, not turning those over, and make sure that you're at least working with them on that process that they're going through and how they're managing that. (PSM-8)

In summary, participants valued achievement, with many aspects related to the short term in order to "survive" (PSM-3) and "sustain" themselves (PSM-8). They also valued control in close alignment with aspects described in their environment, such as having lack of control and having functional constraints that prevented them from accomplishing tasks.

The second dimension of value orientations contrast independent thought, action, and change with preservation of practice, stability, and conformity. Participant characterizations varied in the former orientation from needing "to let [subordinates]

figure out how to do things on their own to retain it better" (PSM-9) to using "policy as a guideline or starting point [to deviate from]" (PSM-4). In the latter orientation, characterizations included "preserving structure when built for safety reasons" (PSM-1) to "transparency and accountability in performing tasks" (PSM-9) as well as ensuring one is "technically sound in representing the logistics competency to others" (PSM-2). Table 4.8 presents representative quotes in the independent thought orientation.

Table 4.8
Value Orientations Related to Independent Thought and Action or Preservation of Practice and Conformity

Characterization	Representative quote
Independent thought	• I try and assess that from whenever directives come down on us. Okay, here is a new policy that's come out. Well, what's that benefit back to us? And sometimes you have to question out of higher authority: "I'm missing the benefit," because when I can see the benefit then it's easier for me to embrace it and say, "Got it. Now I understand why I'm doing this. I understand where the benefit is." And I may be able to add value in that process. If it's rote "just go do something," typically the outcomes aren't as good, the inputs and the whole processing, it just becomes a burden on you instead of part of the job, the fulfillment of the job and making sure you're doing the best with it. (PSM-8) • Part of my experience was the tremendous benefit of getting lessons learned from some really sharp guys with 40+ years doing this stuff handing down their lessons learned, their gotchas and how they overcame them. But then on the other hand, they don't always apply; every one of those can't apply to everything. (PSM-1)
Conformity	• What influences my work is honesty and transparency and accountability. I'm going to hold you responsible and accountable for the tasks. I expect my supervisors to hold me accountable and responsible for what they assign me, and I want my subordinates to hold me accountable and responsible for what they need. (PSM-9)
Preservation of practice	• Practice and policy, you know—they're there, you know, built in blood. Someone crashed and burned over here, did something really bad. It went horribly wrong and then they figured out "because of this." So now they have you know some procedure or standard process to make sure that that doesn't happen. (PSM-1)
Preservation of practice and conformity	• So I've always looked at it as the leader I am going to demonstrate the values. And so when I introduce myself to the team and when we do certain off sites, we'll say: This is what we're aiming towards, being very professional, always representing our logistics competency in a professional manner. So I hold myself accountable as far as to be technically sound so that the advice that I give or the direction or the technical elements of logistics I have are sound. (PSM-2)

In summary, participants valued independent thought and action, particularly in the case of evaluating the applicability of guidance and lessons learned. Conversely, they described value orientation aspects related to conformity and preservation of practice, especially when it related to being professionally competent, accountable, and safe. A summary of PSM value orientation descriptions by code density is depicted in Figure 4.4.

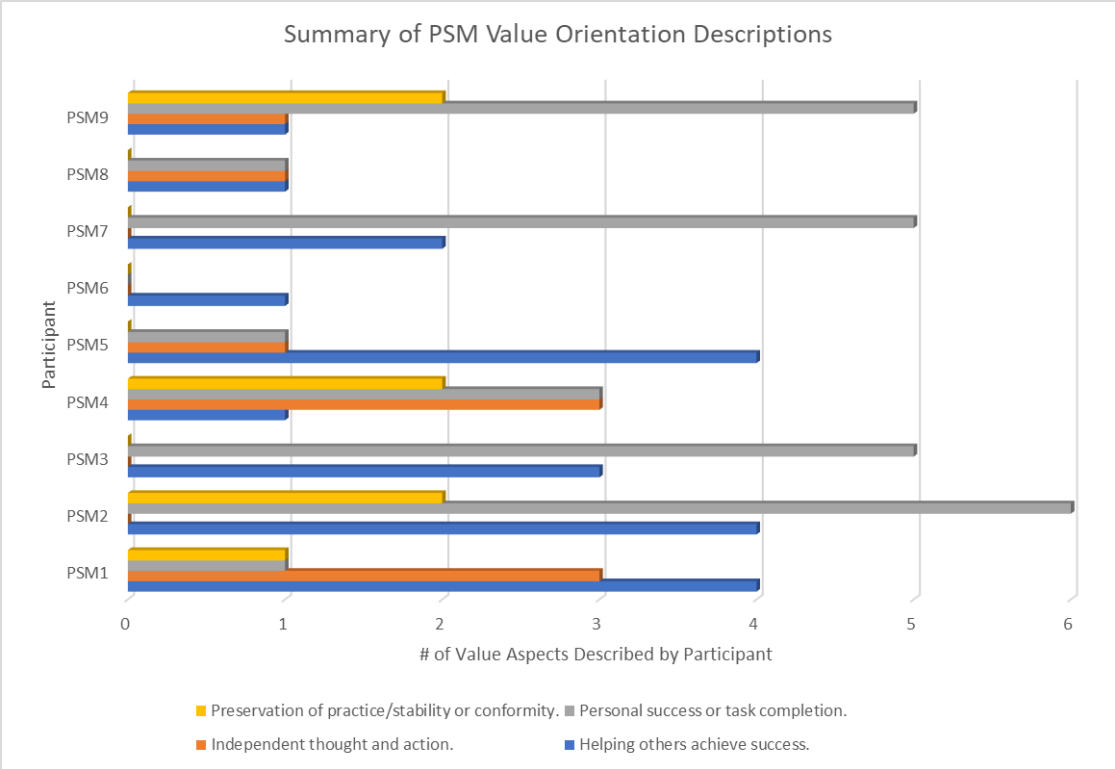

Figure 4.4. Product support manager value orientations.

A further expression of values was developed using participant descriptions of why they remained in their jobs as PSMs. All of the participants described aspects related to helping others achieve success, which included characterizations of improving conditions for the military user and "returning home safely" (PSM-8). They also described helping others in terms of "providing better value for taxpayers" (PSM-4),

"livelihood for family" (PSM-8), and developing team members. Five of the nine participants described aspects of personal achievement or having authority and control. Four of the nine participants described aspects related to affecting change in the system and for their team members. None of the participants indicated that they remained in their job due to conformity or stability. A summary of representative quotes is provided in Table 4.9.

Table 4.9
Value Orientations Related to Remaining in the PSM Role

Characterization	Representative quote
Achievement and improving user conditions	• I just enjoy doing what I do. What I do every day that makes a difference. It's not a job; it's interacting and getting some stuff out there for the fleet at the same time. (PSM-5)
Affecting change	• But I wouldn't want to go anywhere that I couldn't make a difference, where you're just part of this machine. (PSM-3) • I think when you look at it and you can see forward momentum. So what really kind of sustains you is you see it moving from one area to another area to another, you know, and as roadblocks or barriers pop up, you—your ability to either destroy 'em and knock 'em down completely or mitigate 'em in some way. (PSM-9)
Control	• This job is almost if not probably the last step where you can have very direct control over the success, over the outcome for a program. (PSM-3)
Control and achievement	• The sense of managing and controlling the chaos. It is craziness but what else would I want to do. It's something that I enjoy, the sense of accomplishment when you make those small successes. (PSM-2)
Developing team	• I like the position for having the ability to help the others that work within that group grow and learn. I feel the same way within this role [as in a previous role], is trying to help mentor them and help them on that continuum as well. (PSM-8)
Developing team and improving user conditions	• My drive to train people and to do the job right and give the fleet the right—give them the capabilities with the support behind it so we can do—the warfighter can do the job. . . . That's what keeps me in this job. (PSM-6)
Improving user conditions and affecting change	• It's as close as you get to the fleet in NAVAIR, right, being in a program office, so if I had to work at NAVAIR, I always want to be in a program office and I want to affect change. You just want to do your darned best to make sure that the fleet has the tools and equipment and is meeting their RBA [ready basic aircraft readiness] goals. (PSM-7)

In summary, the participants described aspects closely aligned with previous aspects of helping and developing others as well as achievement. Participants also stayed in their roles to affect change in the environment and "control chaos" (PSM-2). Figure 4.5 summarizes orientations by code density and PSM.

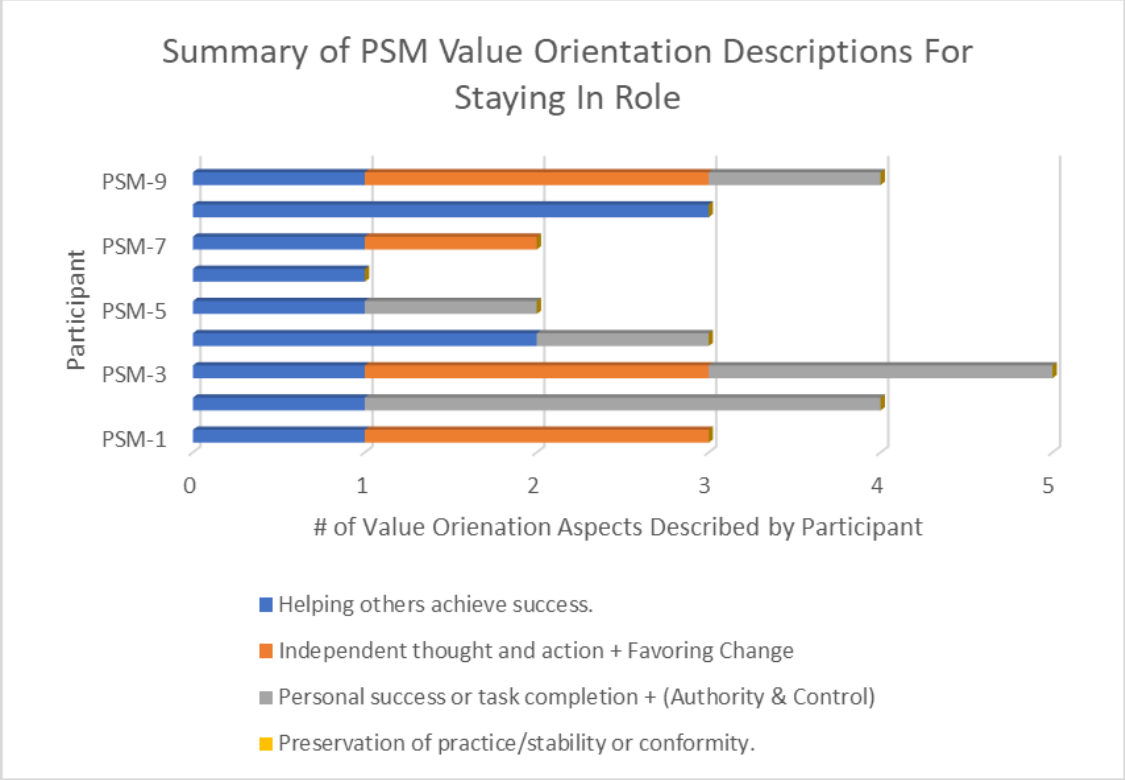

Figure 4.5. Value orientation aspects described by participant.

Value congruency aspects emerged using participant descriptions of how they viewed the organization's values relative to their own. In two instances, participants described values that were congruent with those of the organization in terms of improving conditions for the user via readiness and speed of product delivery to the user. The quotes are summarized in Table 4.10.

Table 4.10
PSM Value Orientations That Were Congruent with the Organization

Congruency	Representative quote
Congruent	• Values I hold and that I pass to my team are in alignment with our—with big NAVAIR requirements of speed to the fleet and ready basic aircraft readiness. (PSM-2) • In the current environment, I will say it is clearly articulated that they share the value of looking for alternative ways to do things, accepting more risk, as long as the outcome is warranted either through a cost savings or more importantly right now the speed to the fleet. (PSM-8)

In summary, value orientation aspects that were congruent between the participants and the organization were relative to the outcome of improving conditions for the user.

In the remaining instances, participants described aspects of value orientations that were incongruent with those of the organization. Some of these aspects of incongruence related to different means to improve conditions for the user (PSM-2, PSM-5, and PSM-7) and developing team competency (PSM-4) versus substituting tools for development (PSM-3). Other aspects of incongruence related to prioritization of functional success over getting improvements to the user (PSM-1), standardization versus empowerment (PSM-6), differences in portraying levels of risk (PSM-2) and affecting change (in personnel), and development of team versus process adherence (PSM-9), as summarized in representative quotes in Table 4.11.

Table 4.11
PSM Value Orientations That Were Incongruent with the Organization

Congruency	Representative quote
Incongruent meaning of value for task achievement	If they're [new processes or initiatives] are going to stay around and be part of our everyday business and the rules that we need to do [to] get things accomplished, then I'm all about it. But if it's the fad of the day and it's just going to go away and everyone just claims victory, it's like: Okay, what did we do it for? (PSM-5)
Incongruent value on best methods to develop team	The thing that works against me, the Naval Acquisition Career Center has a different idea how to train the interns. "Well, they should go on 90-day rotations and get experience; they should be exposed to different things." Instead of "No, how about learning your job first and then get exposure to different things? Teach them what logistics is." Instead it's like an encounter group. (PSM-4)
Incongruent value on means to improve conditions for the user	I feel they have the same values, but I think there's a lot of conflict every day that challenges those values. So it's easy to say, "We need to take care of the current fleet of aircraft that we're supporting," yet the modification programs that are their own entities with their own funding and their own schedules that if I said, "Well, I'm going to push those off because I've got to take care of heavy maintenance on all my aircraft now," that wouldn't fly in any environment, right? So ultimately it comes down to how do I compromise on a daily basis or on a strategic level to make sure that I am supporting the values that I find are most important. Sometimes there's just certain things you can't avoid; you have policies or you have briefing cycles or you have things that you have to meet, data calls, that might not directly correlate to those values or those priorities, but you've got to get them done. (PSM-2)
Incongruent meanings of value of performance	I think some stakeholders within the organization share those values. I think there's a couple outliers that really don't know what performance-based logistics is and what it entails to award though, that probably don't share that value. They either don't understand it or they want the solution so quick. (PSM-7)
Incongruent values on means to improve conditions (people rather than tools)	I think they're so far removed from what we do here that they look at these tools and ways to measure readiness as the solution to the problem, even though I've tried to tell them that success and improving readiness for Naval Aviation starts with the people. . . . If we could just sit down and train people and do better in these things, . . . we would have the success that we need to have. What bothers me is that every time I turn around I see talk about tools. I don't see talk about the workforce. (PSM-3)
Incongruent value of improving conditions for the user versus functional area success	I think there are pockets across this organization that are just so focused on their [functional area] and they don't ever see the warfighter [outcome] that there is loss of focus on really why they're doing what they're doing. The prioritization that they put forth was more of a "this helps us in our stuff; we kind of like doing this stuff more than that stuff," but that's what they use every day. There's some prioritizations that are in my mind get a little misaligned with supporting the warfighter. (PSM-1)
Incongruent meanings of standardization versus empowerment	I've seen the deterioration of staying within standards. Leadership said empower people. They did not say empower them just to let them do whatever they want and not follow any standards. Well, . . . some people went: That means I don't have to follow the standard work packages, I don't have to follow this. So they have seen that things are broken down and we don't have anything across the NAE [Naval Aviation Enterprise] that's standardized. (PSM-6)
Incongruent value of affecting change and developing team versus processes	For example, a guy or girl comes to work, sits down at the desk, does nothing all day long. It's almost impossible to get them to do things. The HR [human resource] rules, the regulations, the political correctness, you can't chastise a person or provide feedback in a negative respect. I mean for every negative you have to give 'em two positives. (PSM-9)

In summary, value orientation aspects that were incongruent between the participants and the organization were relative to the meanings of performance and standardization. There were also aspects of incongruence relative to means and methods of developing others and in prioritization of helping others and affecting change versus functional success and adherence to processes.

Summary of Contextual Profiles

PSMs closely associated their role with their responsibility codified in law. They placed significant emphasis on their role of developing others as the functional or lead expert in logistics while at the same time they operated in an environment where available funding and time to complete tasks were highly variable and constrained, focusing the PSM on near-term priorities and task accomplishment. As they operated in this dynamic yet structured and regulated environment, PSMs experienced ambiguity in how, and how much, they wanted to develop their teams versus accomplishing tasks and contributing as an expert logistician.

Participants valued helping others in order to achieve the goal of providing increased levels of operational readiness. This orientation was congruent with the expectations of the organization relative to the outcome of improving conditions for the user. In order to do this, participants valued developing others to achieve a better understanding of their tasks, recognition of the value of their contributions, and professional knowledge in order to help them be successful. However, the expectations between the organization and the participants relative to the meanings of performance and standardization, the means and methods of developing others, and where the priorities lay to affect change versus functional success and adherence to processes were

incongruent. This created additional tension and ambiguity between helping others and task accomplishment, often in the short term to "survive" (PSM-3), which was also reflected in participant descriptions of why they remained in their roles to affect change and "control chaos" (PSM-2).

The following themes emerged based on the findings discussed in this section on contextual profiles:

- PSMs interpreted the complexity of the environment as dynamic with variable resources and as highly dependent on interaction, resulting in each program being uniquely executed.
- The environment was highly structured by law, policy, and standardized processes and functions that diminished the authority of the individual and presented barriers to interaction.
- There was role ambiguity as PSMs were torn between how much they wanted to develop their teams versus becoming an expert and accomplishing tasks.
- PSMs were aligned with the organization on fleet outcomes but there was value incongruency between expectations and what they wanted to do to achieve those outcomes.

Social Learning Profiles

This section describes findings related to the social learning of PSMs by focusing on the dynamic interactions taking place. Findings are described for interactions during current projects, significant relationships PSMs identified (outside the program or NAVAIR, inside the program, and on their team), significant challenges experienced in their role and how they approached or came to resolve them, feedback and engagement

with other professional logistics organizations, and descriptions of future success. Within each area, findings have been developed into key elements or themes based on analysis of the interview transcripts. Variation within each theme is described, and salient comments are provided to highlight variation.

Interactions During Current Projects

Participants were asked to describe current projects and interactions along with adjustments to any interactions during the project. While all of the participants' project characteristics aligned with the responsibility of developing and implementing a comprehensive product support strategy identified in law (depicted in Appendix G), variations of other aspects of their responsibilities included using appropriate predictive analysis and modeling tools to improve materiel performance and increase operational availability rates while reducing operation and sustainment costs (PSM-1); conducting appropriate cost analyses to validate the product support strategy (PSM-6); ensuring achievement of desired product support outcomes through development and implementation of appropriate product support arrangements (PSM-5, PSM-7, and PSM-9); adjusting performance requirements and resource allocations across product support integrators and product support providers as necessary to optimize implementation of the product support strategy (PSM-2, PSM-5, PSM-6, and PSM-7); and periodically reviewing product support arrangements between the product support integrators and product support providers to ensure the arrangements were consistent with the overall product support strategy (PSM-6). Participant descriptions of a project, associated interactions, and aspects related to adjusting those interactions are summarized in Table 4.12.

Table 4.12
PSM Project Interactions and Adjusted Interactions

Representative project quotes	Representative interaction(s) quotes	Representative adjusted interaction(s) quotes
Reducing the amount of training required for operators and maintainers to be proficient on complex products (PSM-1)	Design engineers—To fight for design with easier operability and maintainability. Resource sponsor— To influence requirement structuring to reflect [in terms of] cost, schedule, or performance that influence PM.	Modeling and simulation engineers—Tie capacity limitations to performance gaps that need to be addressed by resource sponsor.
Prioritizing required maintenance over new capability to sustain readiness (PSM-2)	DAPMLs and fleet support team—To influence develop info on criticality. Program leadership and resource sponsors—To alter funding allocated to modifications and their schedules. Sustainment IPT lead—To co-prioritize maintenance and capability.	Subsystem and product IPTs—Develop lower-level impact data from a wider set of stakeholders to provide balanced alternatives.
Preventing approval of change proposal before design review is completed to ensure configuration is accurate for product support packages (PSM-3)	IPT leads, Contracts, Legal—To preclude approval by others under schedule pressure where approval would create a potential sustainment issue.	Chief engineer—Develop coalition with engineering to highlight sustainment impacts to others.
Changing a current sole-source performance-based contract over to a competitive one with better performance measures (PSM-6)	Multiple service subject matter experts—To gain support for competitive approach. NAVSUP, DLA, and fleet support team—To gain support from stakeholders that would help execute contract and to understand/ develop adequate performance measures.	PM, Contracts, Legal, NAVSUP, DLA, fleet support team—Serve as integrator, communicating to all stakeholders value of approach different than previous 8 years of existing contract. Convincing them it was achievable.
Establishing depot (organic maintenance) capability (PSM-7)	MPC and APML—To provide information on why establishment was behind schedule.	Organic depot personnel—Increase frequency of interaction and level of information (at logistics element per component).
[Generalized] projects requiring additional resources to execute (PSM-8)	IPT leads—To gain support for additional funding that they control.	IPT leads—Develop information more useful to them to expedite decision.

Note. APML indicates assistant program manager for logistics; DAPML, deputy assistant program manager for logistics; DLA, Defense Logistics Agency; IPT, integrated product team; MPC, maintenance program coordinator; NAVSUP, Naval Supply Systems Command; PM, program manager.

In summary, participant project characteristics aligned with their codified responsibilities. Rules or processes to integrate functions and other organizations created role conflict and the need for increased or alternative interactions to leverage resources or authority, obtain additional information to improve understanding, or align meanings of potential impacts or outcomes.

Significant Relationships

Participants were asked to describe their most critical relationships outside of their program or NAVAIR, within the program, and within their team.

Critical relationships between PSMs and others outside their program or NAVAIR. PSM social learning aspects outside of their program or NAVAIR emerged using participant descriptions of their most critical relationships with this group. Participants described their most critical relationships within the program as being with various cross-organizational "requirements" (PSM-1), "fleet [user]" (PSM-2), and other supporting agencies (PSM-4, PSM-6, and PSM-7) outside of NAVAIR but within the Department of the Navy. They also described critical cross-functional interactions such as "logistics competencies" (PSM-3) and cross-level interactions with the "APEO(L) [assistant program executive officer for logistics]" (PSM-8) all within NAVAIR but outside the program, as well as interactions with "PSMs from other services" (PSM-5) during training, and the "OEM [original equipment manufacturer] (and OEM counterpart)" (PSM-6 and PSM-9).

Variation in aspects for the critical requirements and supporting agency relationships included “developing shared understanding of requirements, trust credibility, and how others need your support” (PSM-1); “developing trust [with the user] and better understanding of their issues toward a common goal” (PSM-2); “having resources and presenting a unified position with a provider [supplier] so the provider doesn’t divide and conquer” (PSM-4), “developing a common understanding of what you’re trying to achieve” (PSM-6), and “ensuring they know what a PSM does and having supply support contracts in place” (PSM-7). Variation in aspects for the critical relationship with the original equipment manufacturer included “having daily conversations on contracts and deliverables to understand risk and prioritize fleet readiness” (PSM-6) and “ensuring delivery of a product” (PSM-9). Variation in other aspects of critical relationships included logistics competencies for “obtaining experienced personnel to fill critical positions” (PSM-3); other services’ PSMs “meeting during senior-level courses to discuss ideas and brainstorm” (PSM-5); and having the assistant program executive officer for logistics “serve as a buffer from things coming from outside and interface for things that needed float back out” (PSM-8). Representative quotes for aspects of critical relationships with the PSM outside the program or NAVAIR are summarized in Table 4.13.

Table 4.13
Representative Critical Relationships Outside of the PSMs' Program or Outside of NAVAIR

Critical relationship	Representative quote
PSM–requirements agencies to develop trust and credibility due to role ambiguity	So one of the groups that I'm working with right now is the Naval Munitions Requirement Process, and that's basically all the schoolhouses, all the squadrons, everyone in supply, OPNAV, CNAF, and the headquarters all working together trying to understand how to model our requirement. But once again it's what level of trust is there, what do you bring in credibility to deliver what is needed at that level? It's understanding what your role is and executing your role but then also understanding how other folks need your support and your input to execute their role. (PSM-1)
PSM–Fleet [User] maintenance and supply officers to develop shared understanding of impacts and alternatives	I can say: Hey, maintenance is a big issue because the data is telling me the maintenance is a big issue. That's very generic and high level. If I [said] that, I probably wouldn't build a good relationship with the wing maintenance officer, but if I have some specific items and I say: Hey, our collective goal is ready for tasking or ready for ready basic aircraft. Here's what the data is finding. Does this make sense from your perspective? So, it's communications, it's relationship and trust building, and the maintenance officer and the supply officer within the wing are critical to those goals of [readiness] to fly missions and execute what we need to do. (PSM-2)
PSM–6.0 competencies to increase understanding of need to develop qualified resources	We have major challenges in this program, and I'll tell you we have major challenges across NAVAIR right now, but I can't get the people that I need to have. I've got a couple positions that are critical positions. I need experience but I can't get it. I spent a lot of time talking to 6.8, 6.6 about the stuff that they're pushing over and what we really need to do to improve readiness, 6.7 again about the maintenance planning and IMC, and so my most critical relationships that I have today for this program is the 6.0 competency. (PSM-3)
PSM–OEM counterpart	OEMs, my counterparts that you must have that on a day-to-day communication in the contracts you have with them and the deliverables for sustainment or production, what they're doing on the airplanes to make sure you understand exactly what's going on, any issues they have or anything they think might become an issue. You've got to have a working relationship with them that they understand that you, you understand they're a business and they've got to make money but you also you're a PSM who has to have readiness and not at any cost, but at a certain cost. It's a complete communication cycle, what we're doing; everybody is talking off the same information and understand what are the issues we've got, what are the risks we've got, what do we need to do to mitigate those, so that to me is as the PSM is the most important thing is the communications to make sure everybody has got the right priorities on the things we're attacking to support the fleet and the warfighter and readiness. (PSM-6)

Note. 6.0 competencies indicates NAVAIR logistics functional areas; CNAF, Commander Naval Air Forces; IMC, integrated maintenance concept; OEM, original equipment manufacturer; OPNAV, Office of the Chief of Naval Operations.

In summary, critical relationships with the greater 'system' outside the program or NAVAIR were related to cross-organizational, cross-functional, and public-private interactions. Interactions across these boundaries were related to reducing role ambiguity and developing a common understanding of logistics needs, alternatives, and impacts as well as leveraging resources and processes necessary for PSMs to execute their programs. Lastly, some interactions described by PSMs served as critical interfaces to other interactions (assistant program executive officer for logistics) and for sharing ideas and brainstorming (other service PSMs).

Critical relationships between PSMs and others within their program. PSM social learning aspects within their program emerged using participant descriptions of their most critical relationship within the program. Participants described their most critical relationships within the program as being with the program manager, assistant program manager for logistics, chief engineer, and the co-leads of the sustainment integrated product team.

Aspects of why the program manager was the most critical relationship included "increasing risk tolerance and enabling projects" (PSM-5), "co-identification of needs and requirements to optimize outcomes" (PSM-9), obtaining "advocacy for logistics across program so that subordinates receive support from their assigned IPTs [integrated product teams] to resolve logistics issues" (PSM-8), and obtaining "advocacy when PM [program manager] needs to resolve role or responsibility disputes between functions that impact logistics" (PSM-3). Aspects of why the assistant program manager for logistics was the most critical relationship included "greater achievement at a faster rate with minimal guidance" (PSM-1) and "as the next

level down [from the PSM] keeping everything flowing in the program office" (PSM-6). Aspects of why the chief engineer was the most critical relationship varied from being considered the "closest in function as the technical conscience for the program office through support of the PM [program manager] as gray beards vs. execution or [program management]" (PSM-7) to "establishing a coalition that's more effective than when it's just logistics approaching the PM [program manager] for change [or no change]" (PSM-4) and "co-influence and consideration of functional needs or impacts between each other" (PSM-4 and PSM-7) and "within each other's teams" (PSM-4). Aspects described for why the co-leads of the sustainment integrated product team were the most critical relationship included "being related to most of the daily tasks either [tactically] or strategically" (PSM-2), "providing functional [logistics] input into funding requests by the sustainment IPT [integrated product team] and obtain insight into what is being requested" (PSM-2), and providing "top cover from the logistics competency [who controls the overall organizational funding and process for distributions for sustainment] for the sustainment IPT [integrated product team] during the budget process" (PSM-2). Representative quotes for aspects of critical relationships with the PSM within the program are summarized in Table 4.14.

Table 4.14
Representative Critical Relationships of PSMs Within Their Program

Critical relationship	Representative quote
PSM–Program manager for recursive support and resources	We have different Level 1 leads of different commodity areas, and so if you had the program manager who was putting out their concern for logistics and their backing of logistics, then it was much easier to work within the office as a whole, because when you came over to talk you weren't talking about trade space, you were talking about logistics, and it's important and the program manager has already conveyed I believe logistics is an important component to that. At the IPT level for the deputies, it filters down to them when they try and get the support backing they need of getting their logistics issues funded and supported. (PSM-8)
PSM–Assistant program manager for logistics to get stuff done	So right now I'm you know mentoring him, trying to show him ways to be a more effective and achieve more at his level and just kind of giving him some guidance and some influence of how to interact and how to approach things differently so that there's greater acceptance and then you get greater achievement at a faster rate. (PSM-1)
PSM–Chief engineer as coalition and recursive support within teams	It's a very powerful coalition that we can go into the program manager and say we're not going to do that. When we both go in there and stand together instead of just one of us, he tends to listen and roll the other way. You know, they ignore this: "It's a loggie—eh, that's just a loggie; they'll figure out a way to fix it." But when the chief engineer is in there, that's a very powerful coalition plus the [chief engineer] can influence people to think product support on down through their chain, and I can influence people, talk to your engineer before you do something down through my chain. (PSM-4)
PSM–Sustainment IPT co-leads to leverage resources and allocations	The other element of it is the outward facing, so 6.0 is the controller of the sustainment funding and so there's that interface that the PSM provides going out to 6.0 for all of our I'll call it financial briefing cycle. When sustainment funding comes in to the program, it comes in through 6.0 and then 6.0 doles it out accordingly. So they look to the PSM not to hey, who's the sustainment IPT lead? Obviously 6.0 can go to the PM or things like that, but that relationship that exists already naturally within the competency so they [the sustainment IPT co-leads] get what I'll call the logistics top cover. (PSM-2)

Note. 6.0 indicates NAVAIR logistics functional areas; IPT, integrated product team; PM, program manager.

In summary, critical relationships of PSMs with others in their program involved interactions both vertically and horizontally through the organization. The relationships were limited to four types of individuals within the program structure. Aspects of why

these relationships were critical related to leveraging resources or their allocation, a shared understanding of logistics and its impacts, and resolving role conflict.

Critical relationships between PSMs and others in their product support team. PSM social learning aspects within their product support team emerged using participant descriptions of their most critical relationships on their team. In providing descriptions, participants used commonly interchangeable terms for essentially the same role (i.e., principal deputy assistant program manager for logistics and product support team lead) that is often the next senior civilian subordinate to the PSM and at an equivalent level to the assistant program manager for logistics. Large programs often have two assistant program managers for logistics (one acquisition oriented for new systems and one sustainment oriented for legacy or in-service systems) and two principal deputy assistant program managers for logistics (similarly oriented). For additional context, there are typically a series of deputy assistant program managers for logistics subordinate to the assistant/principal deputy assistant that perform more technical roles within integrated product teams. Participants described their most critical relationship on their team as with the assistant program manager for logistics, principal deputy assistant program manager for logistics/product support team lead, and deputy assistant program manager for logistics. One participant previously noted that the assistant program manager for logistics was also his most critical relationship in the program (PSM-1).

Aspects of why assistant program managers for logistics were the most critical relationship included “moving things forward with minimal guidance” (PSM-1), “getting the PSM up to speed or brief” (PSM-5), “providing unique knowledge on special processes and help alleviate span of control and authority issues for a large program” (PSM-3), “serving as a sounding board for tasks and communicating those tasks to the team” (PSM-

2), and "staying in continuous communication to [get stuff done]" (PSM-6). Aspects of why the principal deputy assistant program manager/product support team lead was the most critical relationship included "serving as a troubleshooter for logistics issues, provide a good understanding of the fleet and run the fleet support team, and think the way [the PSM] does and provide back alternatives for PSM-desired outcomes" (PSM-4) and "trust in carrying forward the PSM's message when he is out" (PSM-7). Aspects of why the deputy assistant program manager for logistics was the most critical relationship included "communicating the logistics message or issues up to [supported] IPT [integrated product team] leads so that logistics was not separated from what the IPT's message was coming back up [the organizational structure]" (PSM-8). Table 4.5 summarizes representative quotes for aspects of critical relationships between the PSM and the product support team.

Table 4.15
Critical Relationships Between PSMs and Others in Their Product Support Team

Critical relationship	Representative quote
PSM–APML to reduce span of control	Because there's no way that you can possibly run an entire program especially one as big as mine with [different] TMS airplanes here and there's really not a lot of commonality between them. So there's no way that without having good APMLs, good midlevel managers, that you have any success. Well, some of it is about the amount of knowledge, missions, and types of funding that they use, and some of it is, you know, complexity, but it's mostly about, you know, span of authority and span of control; there's just too much here. (PSM-3)
PSM–APML as an interface to larger team	So I'm the leader. I'm not executing on day-to-day, so I want to make sure that as I communicate and task and put demands on my team that (1) I've got somebody to bounce those off of, (2) the acquisition APML is going to be the person giving the acquisition deputy APML, so half of the team within our program office, the day-to-day guidance. (PSM-2)
PSM–PDAPML/ PSTLs' common understanding of logistics to respond with alternatives	My product support team leads I have recruited and I've recruited them based on they think the way I do. They execute to the overall strategic outcomes that we're looking for. So if it's low cost per flight hour, higher readiness, and also on a schedule, they understand the whole cost performance schedule piece. We sit and we determine: Okay, what's value to us (should cost, better buying power, things like that), what's that performance we're looking for, all right, and what cost are we ready to spend and when do we need it, all right? They're the ones that come back with options. (PSM-4)
DAPML as interface to IPTs in providing a common understanding of message	Within our organizational structure, I needed them to be the ones that communicated within their IPT. That's how they're empowered; that's where their authority lies within their IPT. The information flows up to the Level 1's from within the programs. I didn't want logistics to be pulled out and separated from that. So my relationship internal to the product support was I've got to

	communicate with them because I am putting them, empowering them to talk within their IPTs and making sure that the information floats up. (PSM-8)

Note. APML indicates assistant program manager for logistics; DAPML, deputy APML; IPT, integrated product team; PDAPML, principal deputy APML; PSTL, product support team lead; TMS, Type Model Series.

In summary, PSMs' relationships with deputy, principal deputy, and assistant program manager leads within their team were critical to accomplish tasking, often due to their common understanding of logistics as well as unique technical knowledge and in-depth knowledge of stakeholders outside the program, which serves as a bridge of understanding between the PSM and those other organizations. PSMs also relied on these members of their team to serve as interfaces to integrated product teams to communicate a common message.

Significant Challenges

Significant challenges experienced in their role. Participants described challenges experienced in their role that reflected aspects including a limited ability to gain a shared understanding of logistics value or implications due to limited routine engagement (PSM-1 and PSM-8); role ambiguity relative to developing shared understanding between senior leaders and the program (PSM-2), with the program manager relative to tasks (PSM-7), and across functions relative to control of resources (PSM-5); limited ability to gain a shared understanding of how to use limited resources to execute sustainment strategies (PSM-4 and PSM-9); and difficulty in getting others to understand and follow rules (PSM-6) or limited ability and authority to align rules between government and industry providers (PSM-3).

While all of the participants described aspects of limited ability, authority, or control relative to the challenge, additional characteristics related to lack of or limited norms and rules being in place (PSM-1, PSM-3, PSM-6, and PSM-8) or limitations to

communication and developing shared meaning (PSM-2, PSM-4, PSM-7, and PSM-9). Representative quotes and aspects of the challenges experienced by the participants in their role are summarized in Table 4.16.

Table 4.16
Characterization of PSM Challenges in Their Role

Characterization of PSM challenge	Representative quote
Limited ability to affect shared value of logistics with IPTs due to lack of routine engagement	Trying to figure out you know how to keep up with all the different IPTs that historically have not engaged logistics and so they built their team structure not engaging logistics, and you know how to get integrated and start participating and start providing value to the different teams that traditionally have not engaged logistics. (PSM-1)
Ambiguous role and limited ability to develop aligned perspectives between senior leaders	So the Naval Aviation Enterprise briefing cycle being the most challenging thing is the role that I play in building those briefs to represent the wing's concerns and also represent the program office's either answer to those concerns or perspective on those concerns. And it ties to building those relationships and getting those sides to either come to agreement or be truly aligned. Some of those priorities aren't going to line up and translating in between sometimes, I feel that's been my most challenging role. (PSM-2)
Difficulty integrating government and commercial business rules with limited authority to change	So that's been my biggest challenge, of trying to take this commercial system and support it within our [government] system and to come up with a strategy to support it. The suppliers for all these parts are commercial. If the government wants to drag them through some kind of a FAR or DFAR knothole, they're like: Okay, we're ready. We'll just add more overhead into our price; we'll add the supplier management; we'll put all your terms and conditions and clauses and . . . [various regulations and buying restrictions]. And the commercial guys are like: Dude, you're not even 1% of our business. We have a way that we do business in the government. It's our bureaucracy, and I have a fleet customer out there that has this expectation. (PSM-3)
Ambiguous role with limited ability to control and manage funding to execute and reduce risk	Back in the day I had a budget; I had money, and you can do stuff with money. Now I go with a tin cup and ask for money. Once I don't and I'm not in charge of my own destiny, it's like then what do I do, right? I just make a risk and then here's the risk of not getting it and showing them. So trying to figure out that role and responsibilities over the evolution of time where now we have to figure out who keeps the resources, the BFM, but go right directly to the PM because you know he overrules all them. (PSM-5)
Ambiguous role with limited authority and limited shared understanding of tasks	I think the most challenging thing I'm having to figure out right now is under our new leadership, what are my roles and responsibilities? You know the job is hard enough, but if you're second guessing those or there's confusion it's like, well, does he expect me to work this or not? Then it adds to the complexity of working the various tasks. (PSM-7)

Note. BFM indicates budget and financial manager; DFAR, Defense Federal Acquisition Regulation; FAR, Federal Acquisition Regulation; IPT, integrated product team; PM, program manager.

In summary, PSMs had difficulty establishing routine engagement across functions, levels, and outside organizations that diminished their ability to communicate and gain a common understanding. Additionally, PSMs experienced role ambiguity with limited authority across those same boundaries, which conflicted with accomplishing tasks.

How they approached or came to resolve challenges. Participants were asked to describe what was most helpful and least helpful in addressing their previously identified challenge. Participant descriptions of what was helpful in approaching their challenges reflected aspects related to increasing (PSM-5 and PSM-6) or establishing regular (PSM-2) interactions to help develop a shared or common understanding. This also included increasing or varying interactions in order to help establish norms (PSM-7 and PSM-8) and common understanding (PSM-9). Other descriptions of helpful aspects related to leveraging resources to increase engagement and understanding (PSM-1) and finding alternative uses for resources (PSM-4) or letting failure occur (PSM-3) to gain an increase in shared understanding. Representative quotes and aspects of what was most helpful in addressing the challenges participants experienced are summarized in Table 4.17.

Table 4.17
Characterization of What Was Most Helpful to PSM Challenge

Helpful aspects	Representative quote
Increasing resources, which increases engagement and understanding to develop trust	So I'm going out and [bringing in resources] and then in that engagement, you know, I'm doing this and this is helping you out, but you really need to help yourself by letting me help you. And so when you achieve in one area that benefits them, then they get a level of trust that you're trying to help them, and then they engage you more and they bring you in—more understanding that you are really going to help them. (PSM-1)
Letting failure occur to gain shared understanding	Sometimes you have to fail in order for people to go: Oh yes, I guess that's not going to work, right. When I came in this program where I meet the deputy program manager, and I said: Well, we've got some issues. We need to work here with the data and the commercial data. And he looks at me and he goes: Huh? We don't have any problems here. And you know, for the longest time, people just didn't believe it. We had to actually fail. We had to actually get out there and fail. . . . And now, you know, everybody is like: Oh, okay, this isn't going to work. (PSM-3)
Developing team and finding alternatives for resources that increase understanding of value of approach	It's surrounding yourself with good guys who can think things through, and I'll use the floorboard thing as an example again. So my guy comes in and says: Hey, don't sweat this floorboard thing so much. Go get us this new floorboard so we can get an [aircraft] up. Then we'll do an aircraft damage report on the airplane when it comes in and we can fix it for like 26K. The big win is when you have smart guys around you who know how to do this stuff so that makes it easy, and it kind of offsets that lack of resources. That's probably how we've gotten around a lot of these resource shortfalls. (PSM-4)
Increasing interactions to develop habit of engagement when issues come up	Increasing the interactions—the amount of facetime with those Level 1's and communicating with them about any kind of issues that had come up. So while—so that balance, striking the balance was I want my deputies within their IPTs [integrated product teams] to have that, but at the same time I've got to go meet with my counterpart and have some of the dialogue about logistics stuff directly with them. (PSM-8)

In summary, PSMs found that increasing interactions, in frequency and across organizational boundaries, was the most helpful means to aid development of routine engagement and a common understanding of logistics value. However, in some instances, PSMs also found that leveraging resources and "letting failure occur" (PSM-3) were the most helpful ways to gain shared understanding.

Variation in descriptions of what was least helpful to participants in figuring out their challenges included a limited ability to develop shared understanding within the

program (PSM-5), horizontally across stakeholder organizations (PSM-6), and vertically through senior leadership (PSM-9). Other aspects that were not helpful related to standardization of information and processes that limited ability to develop understanding and subsequent effectiveness (PSM-2 and PSM-3) or conversely role and rule ambiguity (PSM-4). Remaining aspects included taking too much time to establish routine engagement (PSM-1), peer advice to leverage others' authority rather than increase communication to develop shared meaning (PSM-7), and getting too busy to maintain interactions (PSM-8). Representative quotes and aspects of what was least helpful to participants in figuring out their challenge are summarized in Table 4.18.

Table 4.18
Characterization of What Was Least Helpful to PSM Challenge

Unhelpful aspects	Representative quote
Organizational standardization information that limits ability to develop shared meaning and limits value or effectiveness of meeting	Standardized briefing templates or a standardized set of information that doesn't always apply to our program, and therefore you spend a lot of time either developing something similar to then send a message that answers hopefully their mail. If you want to know about a specific area within our PMA, tell me what you'd like to know and I can probably give you either standardized information that we already have developed or something close, or we can agree upon something that might be of value but isn't just so cookie cutter that really the only time I'm looking at it is to update it before the next briefing cycle. It's not adding value. I don't think it's too helpful in explaining a status or a situation or an issue that we're having or experiencing. (PSM-2)
Role and rule ambiguity in decision making that limits ability to develop shared understanding and delays task completion	People second guessing. We've got too many people in NAVAIR [that] get a vote, and so as you're working up the chain and you get one branch of leadership to understand and then somebody comes out of nowhere and says: Well, I'm not real sure about that. Meantime, you know now the seed of doubt is in this guy's head, and so I've got to start all over again. So it's one step forward, three steps back; that is a pain. (PSM-4)
Limited ability to develop shared understanding across organizations and up the leadership chain	[A counterpart at another command] didn't budget the money. Now they're out of money and we can't put repair in place. So what we did was the BFM and I kind of looked around and said: Hey, you know, this is a repair of a part; it's not centrally managed yet, so we can use [a certain type of [funding] to repair it. The comptroller here bought off on it. The comptroller at the Pentagon bought off on it, and then when it got to Congress and the FMB, they said: Oh, no, you can't do that. (PSM-9)

Notes. BFM indicates budget and financial manager; FMB, Financial Management Board; PMA, program office.

In summary, PSMs' least helpful approaches to their challenges were those that diminish shared understanding at all levels and across organizational structures. Standardization of information and processes that limited the ability to increase shared understanding and created ambiguity in decision making were also not helpful. PSMs also indicated that leveraging others' authority over increased communication was not helpful to increase shared understanding.

Feedback

How PSMs obtain feedback. PSMs described obtaining feedback from others in the environment (nonspecific) (PSM-1, PSM-3, PSM-7, and PSM-8), from senior competency leaders (PSM-2, PSM-3, and PSM-9), from the assistant program executive officer for logistics (PSM-4, PSM-5, and PSM-8), from the program manager or deputy program manager (PSM-2, PSM-7, and PSM-9), from other PSMs (PSM-5), from the assistant program manager for logistics or principal deputy assistant program managers (PSM-2, PSM-5, and PSM-6), from their product support team (PSM-3 and PSM-4), from the fleet (product users) (PSM-3 and PSM-6), from the original equipment manufacturer (PSM-6), and from competency specialists (PSM-8). Aspects described by the participants relative to who gives feedback, what type of feedback is given, and how or when the feedback occurs are summarized in Table 4.19.

Table 4.19
How PSMs Obtained Feedback

Feedback from	Type of feedback	How or when feedback occurs
APEO(L)	Sharing of plans and ideas (PSM-4)	PSM asks for feedback
	Sharing ideas and brainstorming (PSM-5)	At weekly/monthly APEO(L) meeting
APMLs/PDAPMLs	How are things going? Is message from PSM coming across to the team? (PSM-2)	PSM asks for feedback
	Input from APML (not specific) (PSM-5)	As it occurs
	Issues from product support team that can't be resolved at the APML level (PSM-6)	As it occurs
Competency specialists	Sharing of plan and ideas to determine if something is missing (PSM-8)	PSM asks for feedback
Fleet (user)	Readiness metrics and supportability gaps identified (PSM-3)	Periodic performance reviews
	User performance metrics and issues (PSM-6)	Weekly meeting
OEM	Discussion of current issues (PSM-6)	Weekly meeting
Other PSMs	Sharing ideas and brainstorming (PSM-5)	At weekly/monthly APEO(L) meeting
Others in environment (nonspecific)	Manner and frequency of engagement with PSM (more frequent = good, less = perceived as a roadblock) (PSM-1)	As it occurs
	Product and user metrics improved and increased funding for the program (PSM-1)	Periodic program metric reviews
	Body language during conversations (PSM-3)	As it occurs
	Verbal indication of satisfaction with project progress (PSM-7)	Program project status meetings
	Verbal acknowledgement of task completed (PSM-7), on time and benefits (PSM-8)	As it occurs
	People coming to you more frequently with questions for help = more trust (PSM-8)	As it occurs
	Errors made (PSM-8)	As it occurs
PM/deputy PM	How am I doing? (PSM-2)	PSM asks for feedback
	Personal performance review of PSM (PSM-7 and PSM-9)	Periodic review
	Indication of good performance (PSM-9) or appropriate tasks (PSM-2)	Periodic program reviews
	Feedback on soundness of plan (PSM-9)	At meeting every 2 weeks
Product support team	Willingness of people to come work for PSM (PSM-3)	As it occurs
	How are things going? (PSM-4)	PSM asks for feedback
Senior competency leaders	Indication of good performance (PSM-9) or appropriate tasks (PSM-2)	Periodic program reviews
	Positive comments during coincidental meetings (PSM-3)	As it occurs

Note. APEO(L) indicates assistant program executive officer for logistics; APML, assistant program manager for logistics; OEM, original equipment manufacturer; PDAPML, principal deputy assistant program manager for logistics; PM, program manager.

In summary, PSMs obtained cross-functional and cross-organizational feedback as well as feedback from leadership, product users, and product providers that was often shallow to sufficiently address current issues and gaps such as in user performance levels. Feedback was also interpretive based on levels of engagement or requests for help, receipt of additional funding, body language, and indicators of willingness to work for the PSM. Feedback in some cases was also sporadic, sought after, and reactive in pursuit of understanding errors. More proactive feedback relative to plans and ideas was either asked for by the PSM or shared during routine engagements with program leadership and the functional lead at the Program Executive Office when other PSMs were present.

Amount of feedback. All participants described the amount of feedback as not being enough (PSMs 1–5 and PSMs 7–8) or not being useful (PSM-6 and PSM-9). Aspects of participants not receiving enough feedback were described in terms of limitations such as "usually handling issues or discussing items" (PSM-2), "always wanting more information before making a decision" (PSM-4), "not being kicked out" or "lack of feedback meaning things are okay" (PSM-2) or "not enough negatives" (PSM-3). Other aspects included receiving feedback in the form of integrated product teams "pulling you in for expertise" (PSM-1), feedback that was not immediate "unless really major, critical, or you didn't do something right" (PSM-5), "administrative [training not complete]" (PSM-8), "performance evaluations" (PSM-7), or feedback that was not useful in the form of "quick communications on risk or issues" (PSM-6) or "opinions" (PSM-9). Representative quotes for aspects described by the participants relative to the amount of feedback are summarized in Table 4.20.

Table 4.20
Participant Aspects of Receiving Enough Feedback

Aspect of enough feedback	Representative quote
Not enough. Some feedback with IPTs beginning to engage for expertise.	There are still opportunities for improvement. It started off that the production team was the only one that engaged logistics, and now we've got a couple more. And that there's, you know, just like one, partially another one to, you know, get to where they start pulling you in and really start leveraging your expertise. (PSM-1)
Not enough. You always want more information before making a decision.	You always want more. Nobody ever gets enough feedback. More is always better. Even if you can't really address it right then, you can compartmentalize it. I always want to have as much information as possible before it comes time to make a decision. (PSM-4)
Not useful. Quick communication of risk or issues but usually if you mess something up.	From the top level, unless you mess up something and they come down and say something, it's not that immediate feedback loop. We have a monthly meeting with the leadership team that's a pretty open format. We give a synopsis of what we're doing and what's going on, but unless it's really major, something critical or we lost some money or we didn't do something right, you don't really get feedback. (PSM-5)
Not enough. Some negative or administrative [training].	Probably not enough direct feedback. I think that lacks. A lot of it you have to interpret through. [Would like more feedback from] the competency. Yes, I think that would be the one where it's kind of neutral. I never worry about the negative; it's coming in spades. Organizationally our structure is through the competency. There's that competency component of it that's really not involved in, you know, you could go up to them and say: I just achieved this great outcome. And they go: Yes, whatever; have you finished your training? They're worried about an administrative type component of it. But in leadership, you know, where they're the ones saying: Hey, we as logisticians need to embrace, readiness is on us, we need to really engage in performing readiness. And you achieve those outcomes and you don't get the feedback of that's what we were looking for. That piece of it, kind of, is to me is missing. (PSM-8)
Not useful. Lots of opinions.	I think I got more than enough. You know, I think when you get to an ACAT level, ACAT1 level, you have so much assistance that sometimes it's more than you really need, if that makes any sense. Everybody has their own opinion on how you should be doing something, so sometimes, sometimes you just don't want to hear the next person in line. You know what I mean? So basically, that's where I'm going with—I had more than enough, you know. (PSM-9)

Note. ACAT indicates Acquisition Category; IPT, integrated product team.

In summary, PSMs did not receive enough feedback. PSMs described receiving feedback that was too limited (or shallow in being related to solving immediate issues and tasks), in the form of requests for information, administrative in nature, opinionated, untimely, or left to interpretation.

Most useful feedback. Participant descriptions of their most useful feedback were characterized in one of three ways: positive feedback or recognition from others that was seen as validating performance or effort (PSM-1, PSM-5, PSM-7, and PSM-8); negative feedback that indicated a need to adjust performance (PSM-2, PSM-3, and PSM-9); and informational feedback that helped the participant better understand the environment (PSM-4 and PSM-6). Variations in aspects of positive feedback that was described as useful included "receiving more funding" (PSM-1), "acknowledgment by subordinates for development" (PSM-7), award "recognition by senior leaders" (PSM-5), and others "noticing improvement" (PSM-8). Variation in aspects of negative feedback that was described as most useful included that of being from "the spouse that provided grounding" (PSM-3) or reflection on the need to adjust performance, "a subordinate indicating a need to interact with team members differently" (PSM-9), and leadership indicating a "need to develop alternative approaches for issues" (PSM-2). Variation in aspects of informational feedback that was described as most useful included that from the fleet, which provided better "helicopter knowledge" (PSM-4) in the current environment and "information on what the real problems are" (PSM-6). Representative quotes for aspects described by the participants relative to the most useful feedback they received are summarized in Table 4.21.

In summary, PSMs' most useful feedback was that which validated performance, indicated a need to adjust performance, or helped PSMs gain a better understanding of the environment.

Table 4.21
Participant Aspects of Most Useful Feedback

Aspect of useful feedback	Representative quote
Acknowledgment by subordinates for development; validated effort	Useful feedback I would say is thanks for taking me to this meeting. That's normally tied to one of the interns we train, where I think in some cases interns are left to the "hey, go read this or go do this project" instead of bringing them in and exposing them to a larger view of how we operate. (PSM-7)
Negative feedback indicating need to adjust interaction	The most useful piece was one of the site leads said you need to change direction on how you deal with some of the people here. They're not used to somebody from a military background outside of their organization telling them how to do things, to get them motivated to do something. I was a little too gruff for them. (PSM-9)
Negative feedback from competency leaders indicating need to adjust performance	So I got what I'll call negative feedback when I took our initial readiness playbook before 6.0 [leadership] and got a—you know, kind of a good, heated, passionate discussion about: Hey, there's a lot of programs that have aging aircraft and challenges; this isn't going to fly. So I think you always learn the most when you have something that either doesn't go well or is a problem or a challenge, so that kind of helped me early on, because I didn't feel very well prepared to do this but it had to be done. So you kind of take your lumps and you move forward. [It was useful] understanding a need and then how to do it differently in the aspect of I can be realistic in my projection but I need to have solutions. It's kind of not just saying this is the issue but [also] here's some proposed solutions. We've been admiring the issue. Well, we now need to take action, and so there's certain things that I can really take action on both short term and long term that will hopefully help overall readiness. [The experience] helped me to be more prepared and just know how to get it done from a leadership perspective or what 6.0 and higher-level leadership is looking for. (PSM-2)
Informational feedback that provided a better understanding of the environment	Probably from the fleet guys, because I'm not a helicopter guy. I learn new things about helicopters every day I just didn't know, so that's probably— In this particular job, the most useful feedback is getting that detailed helicopter experience because I was a fast mover guy the majority of my career. Just understanding how helicopters work, especially scheduled maintenance because it's so much different especially on dynamic components than the fast movers are, so getting an understanding of that and then being able to apply, you know, basic experience working with [engineering], but having the base helicopter knowledge is invaluable to me. (PSM-4)

Least useful feedback. Participant descriptions of their least useful feedback were characterized in one of five ways: as generalized positive or negative feedback that had limited context (PSM-5, PSM-7, and PSM-8) or that "inflates your ego" (PSM-3); someone with limited or no experience telling you how to do things (PSM-4 and PSM-9); receiving "training on theory and statute that does not help with day-to-day execution" (PSM-2) in context; being told that "input would be valuable and not being engaged to participate" (PSM-1); and being told value of "using competency expertise to help solve

problems but the competency is unable to help with solution or ends up referring back to program for information" (PSM-6). Table 4.22 summarizes representative quotes for aspects described by the participants relative to the least useful feedback they have received.

Table 4.22
Participant Aspects of Least Useful Feedback

Aspect of less useful feedback	Representative quote
Indication that input would be valuable and not being engaged to participate	Me saying "I could really help you there, you need to invite me," and then they agree. And then you get busy doing other things, then you look on the schedule and you notice they're having that meeting over there and they didn't invite me. There is a subtle intent there and a message in "well, we didn't invite you." The intent of I don't see you as value added so I'm not inviting you, and that is a form of feedback. (PSM-1)
Training on theory and statute that does not help with day-to-day execution in context	[Training on] the theory of how things are done and here's the statutes that drive them and empower it and things like that, and then we come back and we jump into our jobs and we execute as best we can based on the information and the resources we have. I appreciate that class and understand why they have it, but I don't think it was as far as on a day-to-day basis helping me execute my programs. There were, I'm sure, a few nuggets I took away, but not 2 weeks of being away from my desk and program. (PSM-2)
Someone with no experience telling you how you should do things	When I have somebody who I know has no experience in something and they try to tell me: Hey, you ought to do this. That's useless feedback to me or telling me something I already know. For example, they sent something out about: Hey, you should leverage off FMS [foreign military sales] dollars to keep your domestic stuff going. Well, look who just got here. You know, I've only been doing that for 4 years and been successful, even though you chewed me out for doing it [on a previous occasion 2 years ago] because you didn't understand what I was trying to do at the time. (PSM-4)
Input indicating value of using competency expertise to help solve problems but competency unable to help	I mean you go to them [the 6.X competencies] with an issue and you ask them for the help, and it ends up coming right back around through your people of saying: Hey, how can we get this information? I always hear from the 6.0 leadership, "Reach back to the competency." Well, I usually reach back, but there's nothing there. Every time I turn around there's a new one [process or tool] and you can't run it on an NMCI [Navy/Marine Corps Intranet] machine. I'll give you an example, "You should use Air 6.7," so I went to 6.7 and said, "Okay, I'd like to pay for work years for people to do this." "Well, we can't support you; we don't have the people." (PSM-6)
Generalized positive or negative feedback with limited context	General feedback tends not to be that valuable to me, and that could be positive or negative, so when you call in the entire team or all-hands meeting, "Well, you guys are doing good"—not really meaningful-type feedback or we're getting better or something like that. Calling people together and going: We have a problem. Well, you kind of copped out; you didn't want to address the real issue, so now you're going to come tell us all; that way you don't have to look somebody in the eye and tell them: Hey, that really didn't work out well. I would say that's been the least useful and we do get a lot of that stuff. (PSM-8)

In summary, PSMs' least useful feedback came with lack of engagement, experiences, and training that was irrelevant in the context being experienced or lacked meaning in substance or value to task accomplishment.

Engagement of other professional logistics organizations. Relative to the level of interaction with external logistics or other professional organizations, six participants identified no interactions (PSM-1–5, PSM-7). One identified an interaction with the Veteran of Foreign Wars "but nothing from a professional standpoint" (PSM-9). Of the remaining two participants, one initially identified no interaction but then recalled having "belonged to International Society of Logistics (SOLE) in the past" (PSM-6) and the other described "applying for SOLE but receiving no response" (PSM-8). Participants were also asked whether interacting with other professional organizations might be helpful in performing in their role. All but one participant (PSM-6) described helpful aspects of interacting with other professional logistics organizations. Six of the participants described aspects of why they thought interaction with other professional organizations would not be helpful in performing their roles as PSM.

Aspects that were described as being helpful included general knowledge or functional area improvement such as "an additional knowledge or learning source" (PSM-1) or as a means of "exchanging information" (PSM-4 and PSM-8) or "networking" (PSM-3), "making you a better rounded logistician" (PSM-7) or as a logistics "refresher as you're working toward their certification" or just "obtaining the certification would be good in general" (PSM-9). Other aspects were described as more oriented toward their job, such as "gaining a better understanding of industry practices" (PSM-9) or "gaining knowledge from a subject matter expert that has experienced what

[the PSM] is going through [and] information is power" (PSM-2) and more specifically "on what contracts are available for use or training in a specific skill set" (PSM-2). Representative quotes and the aspects described as helpful are summarized in Table 4.23.

Table 4.23
Most Helpful Aspects of Other Professional Organizations

Helpful aspect	Representative quote
Functional knowledge	From a contractor's perspective, having a SOLE certification gives you some points as far as whether you're a senior logistician or not, if you're a CSS, but within the government I mean it's a good thing; any type of certification, like that is a good thing. (PSM-9)
	I think it just makes you probably a better-rounded logistician, to be honest with you. (PSM-7)
Role knowledge	Well, you'd probably be able to understand some of the intricacies better that the industry uses, if they're following those types of practices, you know, because sometimes it becomes a strain working with some of the OEMs, like you just want to scratch your head and go: Where did that come from? Or why are you doing things that way? That's so foreign to the way we do things. If they're following some of those precepts, it might be a good idea to have at least some insight and knowledge of that professional certification. (PSM-9)
	So I think refreshing and looking at the books and looking at the study guides to get ready to prepare for that [certification exam], I think yes, I think that would be value-added, because again depending on what program you're working, you might not— and what phase that program is in, you might not be doing something, but if you refresh that material it's like taking a DAWIA class. (PSM-5)
Functional knowledge and role knowledge	So big-picture wise, other professional groups that focus on logistics or supportability or supply chain management or any of those things I think are beneficial just because you never know what you'll pick up or information or insight into different contracts that may help you or specific, you know, skill set development. If somebody looked at it and said: Hey, here's—we did research, there's X number of contracts out there that accept X number of— you know, appropriations, and here's the scope and here's who that would be open to. I think that would probably be something that is beneficial or something I can use or utilize on a daily basis. (PSM-2)
	SOLE would be helpful, I think, if I was going into another product line. Additional reach back and insight, you know, in learning experiences. (PSM-1)

Note. CSS indicates contractor support services; DAWIA, Defense Acquisition Workforce Improvement Act; OEMs, original equipment manufacturers; SOLE, International Society of Logistics.

In summary, PSMs were not engaged with outside professional logistics organizations and therefore received no feedback from them. However, PSMs did feel that there would be value in engaging those organizations to obtain additional logistics

functional knowledge or to gain insight into industry practices, contracts that could be used, and direct related experience from another individual.

Participant descriptions of why other professional organizations might not be helpful included those where the participant felt "more experienced" (PSM-4) or "would end up teaching" (PSM-1) and those where value was described as limited due to "program uniqueness" (PSM-2) or "language uniqueness" (PSM-6) or "differences in how industry does things and the government does things" (PSM-9). Some aspects indicated there may be no value since "it's a bunch of people gathering around to admire problems" (PSM-4) and "no one has ever told [the PSM] about how it advances your career, knowledge, or expertise" (PSM-3) as well as PSM "preference for more of a mentoring model" (PSM-1). Representative quotes and the aspects described as not being helpful are summarized in Table 4.24.

Table 4.24
Least Helpful Aspects of Other Professional Organizations

Unhelpful aspect	Representative quote
Participant more knowledgeable	I think I'd end up teaching more. I've probably got a stronger sense of how to inject into the design process corrective actions or design features that start upfront. (PSM-1)
Uniqueness of every program	Doing it a day-to-day, the PSM job, it's unique to your platform, and no matter how much high-level stuff, leadership, communication, critical thinking, when I'm told to build a playbook or I'm told to execute a technical directive or an engineering change or analyzing degraders or things like that, yes, there's certain steps I can follow but there's uniqueness. Maybe there's something similar on another platform and if I'm talking to those PSMs, but then time becomes, right, everybody is busy and running around. So if we have forced town halls or forced, you know, shared experiences or group—Hey, this is something we all experience; let's talk about this—it's hard because it is program specific and program unique. (PSM-2)
Different language	It's really hard for that, and I mean you get into these jobs. . . . If you're a PSM in a fully acquisition program, you don't even talk the same language to a guy that's in a sustainment. You don't even talk everything, the half language like that I have to do for sustainment and production. (PSM-6)
Differences between industry and government	But I think there's so much difference between how industry does things and how the government does things, that it's always—anything like that's beneficial, but I don't think it's a requirement. (PSM-9)

In summary, PSMs felt that there would be limited value in engaging with outside professional organizations due to the PSMs' unique contexts, extensive experience, and in some cases simply not having awareness of what those organizations offer.

Descriptions of Future Success

Participants were asked to describe how they might have achieved success if it were 10 years into the future and their team or program was featured as an exemplar for how acquisition programs should function. Participants characterized aspects of their team's or program's success that included having a "well-developed team that thoroughly understood logistics" (PSM-2, PSM-3, PSM-4, and PSM-7), "followed the rules" (PSM-4), and was able to "communicate impacts well" (PSM-2 and PSM-7). All but one participant (PSM-1) included aspects that included "maintaining focus on outcome" (PSM-8) or featured successful readiness or supportability outcomes (PSM-2 through PSM-7 and PSM-9). The remaining aspects described were progress oriented (PSM-1 and PSM-8), multiorganizational teamwork oriented (PSM-9), or "logistics being recognized as critical to aircraft readiness" (PSM-2). Representative quotes and the aspects described in future success are summarized in Table 4.25.

Table 4.25
Participant Aspects of Future Success

Characterization	Representative quote
Logistics recognized as critical to readiness	You know logistics saves the day; logistics is recognized as critical, and I think our NAVAIR organization is realizing that now. So, logistics is recognized as an important element and given its due and— you know, logistics is there to either save the day or the importance of logistics is acknowledged and given the resources and support that it needs to therefore then sustain and support and take care of those ready basic aircraft. (PSM-2)
Focus of the team on outcome and value-added progress	I would say it would have to talk about remaining focused on an outcome and putting efforts toward value-added outcomes and trying to, having the ability to deflect things that would interfere with myself or the team's ability to remain focused on that outcome to the maximum extent possible. What I do notice in general is there's a tremendous amount of things that can be interruptive to our focus on acquisition, and whether that be a new policy coming out, data drills, you know, coming out. (PSM-8)
A well-developed team that followed the rules	And so you follow those rules, you do the right thing. . . . Nobody goes to jail for doing the right thing. And then you draw upon the folks and the resources that you handpicked; you built that team and you let them do what they can do. Don't close your mind to anything; you know, keep an open mind on how you're going to attack problems, but you know that's probably the best thing I have for you. (PSM-4)
Readiness outcome through logistics understanding and ability to communicate impacts	Program meets readiness goals. So I think part of the story would be they understood the—they understood all the logistics elements and they understood how those logistics elements, if not funded properly, would impact readiness. The team had the ability to convey that to leadership and understand how all these elements worked together to give you the best optimized readiness. (PSM-7)
Multi-organizational teamwork that provided a new technology to the warfighter that was supportable and sustainable	The resource sponsor, the program office, and you've got the OEM [original equipment manufacturer], and if any one of those three legs falls down on their responsibilities, then it's not going to be exemplary. You'll be in the newspaper, but it won't be for being a goodie. That we implemented a new technology into the warfighter's toolbox. We have successfully integrated new technology into the system and made it supportable and sustainable. (PSM-9)

In summary, PSMs described future success unanimously as being due to having a well-developed team. Future success was also ascribed to maintaining focus on an outcome while making progress and cross-organizational teamwork.

Summary of Social Learning Profiles

While the participants' current projects aligned with their codified responsibilities, rules and processes that otherwise rationally integrated functions and other organizations created role conflict and the need for increased or alternative and routinized interactions to improve understanding or align meanings of potential impacts or outcomes.

PSMs relied on critical relationships across organizations, functional areas, and industry, and vertically from teams through senior leadership levels, to reduce role ambiguity and develop a common understanding of or recursive support for logistics needs and risks to affect desired outcomes. However, PSMs had difficulty establishing routine engagement across functions, levels, and outside organizations that diminished the ability to communicate and gain a common understanding. PSMs then utilized those relationships, particularly within their product support teams, that they tried ardently to develop, to serve as a bridge of understanding between them and others. Even with those bridges, PSMs continued to experience role ambiguity with limited authority across those same boundaries, which conflicts with accomplishing tasks.

PSMs found that increasing interactions, in frequency and across organizational boundaries, was the most helpful means to aid development of routine engagement and a common understanding of logistics value in approaching their challenges. PSMs also found that standardization of information and processes as well as ambiguity in decision making and leveraging others' authority over increased communication were not helpful and diminished the ability to increase shared understanding.

PSMs obtained cross-functional, cross-organizational, and cross-level feedback, but it was often limited for the purpose of sufficiently addressing current issues and gaps such as in user performance levels. Feedback was also interpretive, sporadic, sought after, and reactive in pursuit of understanding errors. More proactive feedback relative to plans and ideas was either asked for by the PSM or shared during routine engagements with program leadership and the functional lead at the program executive office level when other PSMs were present. Overall, PSMs did not receive enough feedback. PSMs' most useful feedback was that which validated performance, indicated a need to adjust performance, or helped PSMs gain a better understanding of the environment. Their least useful feedback came with lack of engagement, experiences and training that were irrelevant in the context being experienced, or a lack of substance or value to task accomplishment. PSMs also did not seek engagement with outside professional logistics organizations but felt there would be value in obtaining additional logistics functional knowledge or gaining a better understanding specific to their role relative to insight into industry practices, contracts used, or directly related experience. Conversely, they felt that there would be limited value due to the PSMs' unique contexts and extensive experience.

PSMs unanimously felt that future success was reliant on having a well-developed team that maintained focus on an outcome to make progress utilizing cross-organizational teamwork.

The following themes emerged based on the findings of the research discussed in this section on social learning profiles.

- PSMs operated in a highly structured environment that presented boundaries that limited information flow and presented difficulty in communication and developing routines that aligned meanings and shared understanding across those boundaries.
- PSMs attempted to adjust, increase, and routinize interactions in developing shared meaning but often were reactive to emerging needs, with limited authority and resources, which often left the short-term and least helpful alternatives of leveraging others' authority or letting the system fail in order to gain shared understanding.
- PSMs leveraged key relationships to serve as bridges of information but often received limited feedback to resolve short-term issues in order to complete tasks.
- There was role ambiguity as PSMs tried to develop interactions with diminished authority across organizational structures, functions, and within their programs, which conflicted with accomplishing tasks.

Summary of Themes

Seven main themes emerged from the research:

1. PSMs operated in complex environments that were dynamic with variable resources and highly dependent on interaction, resulting in each program being uniquely executed.
2. The environment was highly structured by law, policy, standardized processes, and functions that diminished the authority of the individual and presented barriers to interaction to achieve desired outcomes.

3. The highly structured and boundary-rich environment limited information flow and presented difficulty in communication and developing routines that aligned meanings, value orientations, and shared understanding across those boundaries.
4. PSMs attempted to adjust, increase, and routinize interactions in developing shared meaning but often were reactive to emerging needs, with limited authority and resources, which often left the short-term and least helpful alternatives of leveraging others' authority or letting the system fail in order to gain shared understanding.
5. PSMs leveraged key relationships to serve as bridges of information but often received limited feedback to resolve short-term issues in order to complete tasks.
6. PSMs were aligned with the organization on improving fleet outcomes and with the speed of delivering products to the fleet, but there was value incongruency between expectations and what they wanted to do to achieve outcomes.
7. There was role ambiguity in two dimensions, as PSMs were torn between how much they wanted to develop the team and develop interactions versus becoming an expert and accomplishing tasks.

The next chapter discusses the significant themes of the findings and integrates the themes with the literature to review interpretations and conclusions of the study, followed by recommendations for theory, research, and practice.

CHAPTER 5:

INTERPRETATIONS, CONCLUSIONS, AND RECOMMENDATIONS

This chapter describes the interpretations, conclusions, and recommendations of this study focused on understanding the nature of the social learning process within complex acquisition programs as described by product support managers (PSMs). It also discusses the meaning of the results by integrating them with past theory, research, and practice and discussing implications. The first section interprets the findings and develops conclusions. The next section provides recommendations for theory, research, and practice. The final section discusses limitations of the study.

Interpretations and Conclusions

This section presents the interpretations and conclusions from this study relative to the themes across the contextual and social learning profiles. When I began this study, I fully expected to find that PSMs were operating in a slow, bureaucratic, rule-filled, and highly rational environment that was so complex as to be barely comprehensible; I expected some aspect between the environment and the PSM to be missing, whether it was a rule or process, some form of learning component (i.e., training), or a key interaction with another role. Part of what the study found is that PSMs do operate in complex systems that are highly structured, organizationally and functionally boundary-rich environments, but at the same time they experience significant dynamics, variable resources, diminished authority, and significant value differences with the organization. While some of the environmental aspects were still relatively close to the expectation, PSMs' experiences place them in unique circumstances that increase their dependency on

interactions and adjusting those interactions *in the moment* while the previously mentioned boundaries hinder interaction and standard work processes lose applicability in those moments.

Additionally, the need for speed on near-term problems with minimal feedback further presses the PSMs to prioritize task accomplishment over increasing interactions and team development, creating both role ambiguity and value incongruence. These system characteristics clearly are at odds with what would we would normally perceive to be a highly organized, rule-laden bureaucracy or rational system of "collectivities oriented to the pursuit of relatively specific goals and exhibiting relatively highly formalized social structures . . . , where individual actions are performed by purposeful and coordinated agents" (Scott & Davis, 2015, pp. 24, 36). The system that PSMs operated in clearly does not appear to be a model of rationality. It is on this stage that the study's findings (associated parenthetically by theme number within the interpretations and conclusions where relevant) are interpreted relative to the systems and structuration literature. Three conclusions are drawn based on the interrelated themes or findings that PSMs are effectively *leveraging different operating systems*, or apps in more contemporary terms, to maximize the variety of small alternatives they have (Themes 1–7); *countering the power of the system* through meaning making, developing their unique abilities (as well as their team's), and trying to reduce their isolation (Themes 2–7); and *increasing the velocity and volume of social learning* to make progress through trial and error and satisficing without going to jail for breaking the law or getting fired for not accomplishing tasks or creating too much risk (Themes 2–7).

Leveraging Different Operating Systems

The environment of an organization "can be seen as a store of resources as well as a source of opportunities and constraints, demands and threats" (Scott & Davis, 2015, pp. 19-20). This environmental definition helps explain the dynamic and variable resource nature of the complex system experienced by PSMs. Further, the need for information and interaction in these dynamic circumstances is characteristic of an open system (as opposed to a rational or natural one) that can be seen as "congeries of interdependent flows and activities linking shifting coalitions of participants embedded in wider material-resource and institutional environments" (Scott & Davis, 2015, p. 31). Understanding the nature and extent of how PSMs' social learning begins with how they are perceiving and responding to the system as well as how the system is responding and providing feedback to them.

PSMs described activities and an environment that negotiate all three forms of systems (functional, structural, and interpretive) as defined by Jackson (2009). These forms generally involve being able to define purpose to establish system boundaries and then understand components, relationships, dynamics, and outcomes based on those dynamics (Themes 1–6). PSMs are highly experienced people who use their skills and "abilities to apply sound reasoning in a given situation" (Dorner, 1996, p. 199). 'Sound' in this case is meant as varying their view of the system to come up with an appropriate response in action. Varying their view of the system enables them to "transform transient experiences into internal models and create ideas that guide future action" (Bandura, 1986, p. 18) and practically leverage a creative complementarity between systems views, while at the same time the limited information flow (Theme 5) and the dynamics of value

incongruency (Theme 6) attempt to limit that complementarity (Theme 3). They operate in functionally constructed organizations in integrative-type roles (managers). These functions often create boundaries that limit authority (Themes 2–4), create role ambiguity (Theme 7), and result in processes that are designed to reconstruct the parts to determine where everyone ends up, such as systems engineering technical review events that are combined lists of functional tasks completed and results as well as independent logistics assessments that are constructed and executed in the same fashion. PSMs also work toward structural solutions (where the system is expected to perform to the 'universal' requirement such as readiness), requirements, or goals (Themes 4 and 5) to interpret the system differently on any given day with limited feedback (Theme 5). They try to develop approaches that inform outcomes (i.e., modeling alternatives to get to the same outcome) as well as leverage information and resources to change the outcome itself (Themes 3–5). Lastly, PSMs are attempting to understand and influence the environment and increase their trade space while the constrictive environment adjusts and responds in kind, producing a "collective efficacy to exercise control over outcomes of the social system" (Bandura, 2001, p. 1). These active learning experiences focusing on interpreting results and applying them are an interpretive form or view of the system that attempts to "contextualize individually held workplace knowledge" so that it can be shared more easily (Davis & Somerville, 2006, p. 138) or create routines that enhance individual and team effectiveness (Themes 4–6). While PSMs are highly experienced individuals, it is impossible to have or know all appropriate responses to the environment, as each of these operating frameworks requires alternative understandings in the current circumstance, as depicted in Figure 5.1.

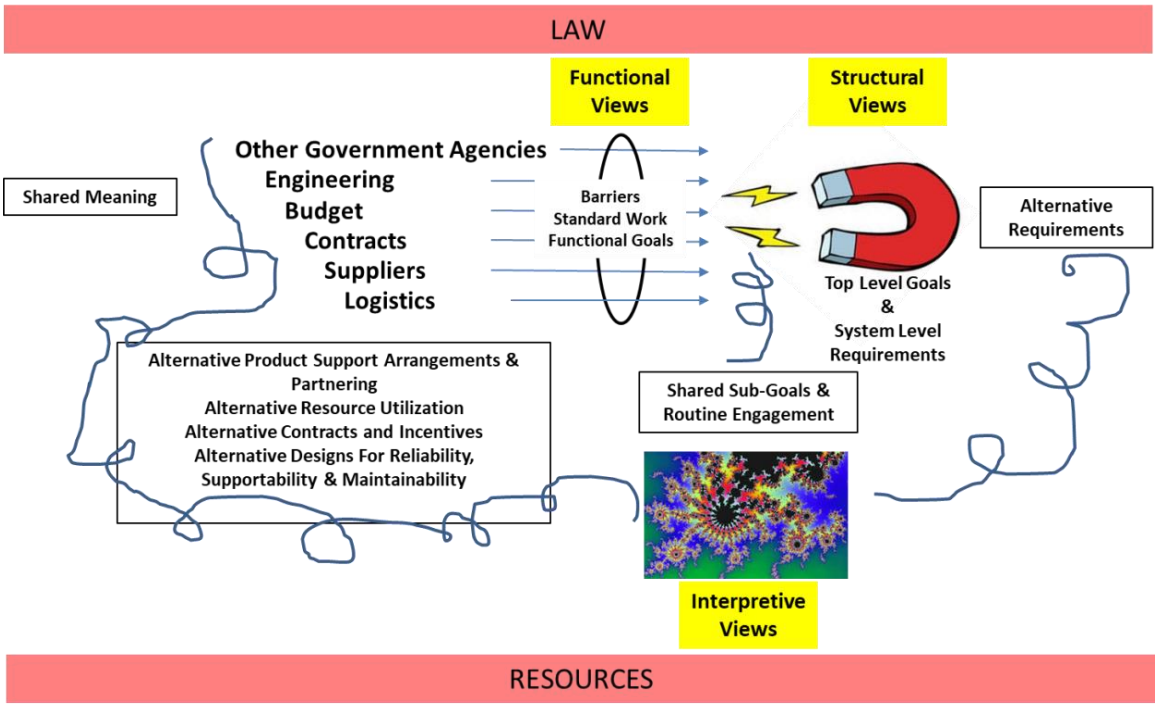

Figure 5.1. Varying systems views.

In short, PSMs are trying to attain the requisite variety (Ashby, 1956) and the requisite complexity (Yaneer, 2004) for both the individual and the system to remain viable (Beer, 1985). The system emerges in its various forms, functionally and structurally, where the "value is on the object over subject . . . and structure over action" (Giddens, 1979, p. 50) and is effectively in a competition with the PSMs' interpretive approaches as they try to balance action against compliance with organizational and functional demands but most importantly the power of the law (Themes 1–6).

Countering the Power of the System

PSMs described significant barriers and a lack of interactions and feedback to solve or handle all the tasks and problems as they emerge, let alone accomplish their responsibilities in accordance with the law (Themes 2 and 7). They did not describe trying to change law and to an extent even went out of their way to not pursue authority as a means to an end. PSMs also did not describe value orientations relative to preserving practice and conformity, but they did acknowledge trying to achieve leaderships' desires and complete tasks (Theme 6). In doing this, they described frustration and ambiguity in trying to balance the power of a system that has processes, structure, and responsibilities governed in policy and law with their meanings of employee value, honesty, and doing what's best for the user while solving unique problems and trying to obey in the isolation created through lack of feedback and function and organizational barriers (Themes 2–5 and Theme 7). Complex systems, social learning, and negotiation of structure all require feedback. PSMs often balance the tensions between system domination and creating meaning through leveraging the fruitful ambiguity of roles, resources, and limited information flow (Themes 1–5 and Theme 7). The negotiation of structure becomes a negotiation of meaning and routines or norms for the PSM versus domination by the system at large (Themes 2, 4, and 5), as shown in Figure 5.2.

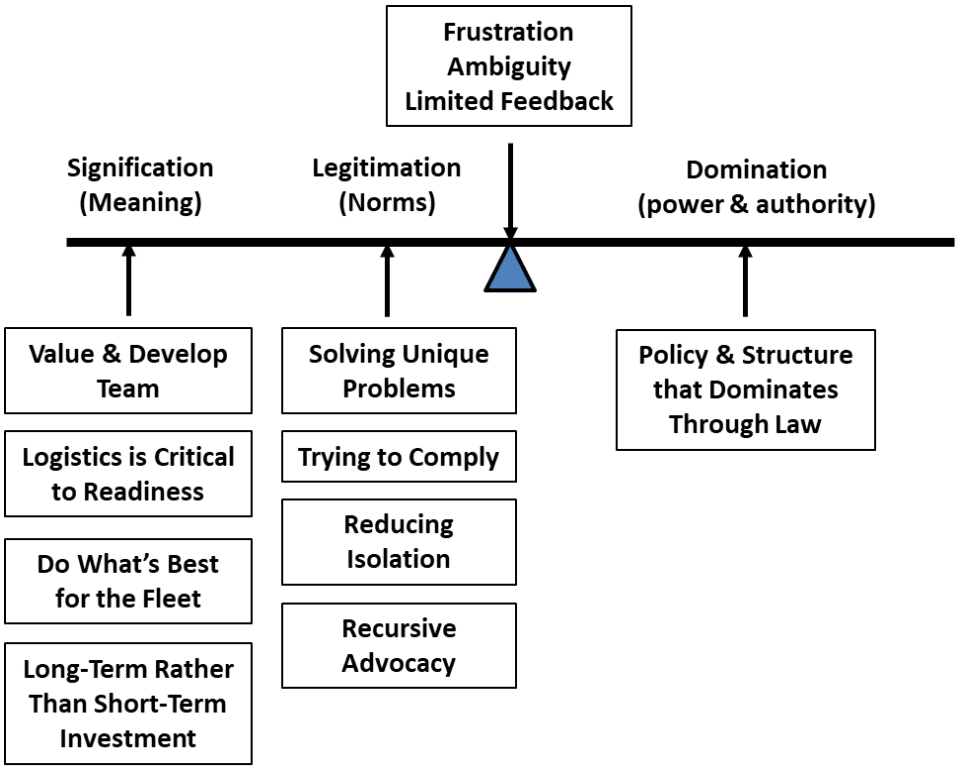

Figure 5.2. Balancing power through shared meaning and influencing norms.

Here is where the interactions depicted in the conceptual frame come into play. In reviewing PSMs' interactions and approaches toward challenges, it becomes clearer that they established a baseline understanding of the problem in terms of power or authority, shared meaning, and level of engagement (Themes 2 and 3). At a second point in time, as PSMs described what was most helpful in approaching the challenge, the findings are clear that PSMs adjusted their approaches through navigating structural modalities of Domination (power and authority), Signification (shared meaning), and Legitimation (routinization) (Themes 4 and 5), as depicted for each PSM in Table 5.1.

Table 5.1
PSM Structuration in Approach to Challenge

PSM description of challenge	Most helpful approach relative to challenge
Limited ability (limited power) to affect shared value of logistics (limited signification) with IPTs due to lack of routine engagement (limited legitimation).	Bringing in money/resources (increasing power) that increased value or meaning of engagement (increasing signification) that begins to increase routine engagement (increasing legitimation).
Ambiguous role (role ambiguity) and limited ability (limited power) to develop aligned perspectives (limited signification) between senior leaders.	Working through meanings through discussion (increasing signification) and then doing it again multiple times through recurring meetings and briefings (increasing legitimation).
Difficulty integrating government and commercial business rules (limited legitimation) with limited authority to change (limited power).	Letting failure occur (increasing power through system) to gain shared understanding (increase signification).
Lack of ability to obtain money to perform tasks as PSM is unable to convince leadership (limited power) to prioritize long-term investment over short-term investment using data to develop shared meaning (limited signification).	Developing team and finding alternatives for resources (increasing power) that increase understanding of value of approach (increasing signification).
Ambiguous role (role ambiguity) with limited ability to control and manage funding in order to execute (limited power) and reduce risk.	Developing increased understanding with PM through direct communication and seeking advice from previous PMs (increasing signification).
Inability to get the user (limited authority) to perform maintenance in accordance with instructions (limited legitimation).	Developing common understanding of logistics impacts through increased communication with user with uniformed personnel (increasing signification) and recurring face-to-face meetings (increasing legitimation).
Ambiguous role (role ambiguity) due to not understanding responsibilities in program office with limited authority (limited power) and limited shared understanding (limited signification) of tasks.	Presenting position directly to PM (increasing signification) after thinking through process and discussing with other PSMs and then wait to see how implementation actually operates (working toward increasing legitimation).
Limited ability to get counterparts (limited power) to routinely engage (limited legitimation) and obtain logistics impacts.	Increasing interactions to gain better understanding of logistics (increasing signification) and develop habit of engagement when issues come up (increasing legitimation).
Limited ability to obtain funds (limited power) due to lack of common understanding of how funding may be used (limited signification).	Working with senior leaders to develop common understanding of issue (increasing signification) to gain advocacy with Financial Management Board (increasing power).

Note. IPT indicates integrated product team; PM, program manager.

As PSMs continuously pursued the requisite balance of power with the system, they leveraged means of increasing agency in social learning processes through "direct personal agency, proxy agency, and collective agency . . . to achieve collective efficacy" (Bandura, 2001, p. 1) (Themes 4 and 5). Collective agency is achieved as "the product of shared intentions, knowledge and skills of its members, but also of the interactive, coordinated, and synergistic dynamics of their transactions" (Bandura, 2001, p. 14). PSMs pursued this collective efficacy in social learning through navigation of sociostructural functions between themselves and others in their authorized roles (Giddens, 1984). Improving the interactions and the effectiveness of working together as a group may be enhanced through further development across all functions of a common complex systems language. The findings are consistent with the literature in terms of PSMs and environment interaction or structuration to increase social learning.

Increasing the Trade Space for Social Learning

In order to make progress, PSMs are proceeding through trial and error and satisficing at risk to complete tasks as fast as they can (Themes 4 and 5). Concurrently, they are attempting to develop themselves and others, expand the variety of relevant feedback through direct engagement with their fleet customer, and shed the burden of extra tasks through encouragement of recurring engagement (Themes 4–7). On their own part, PSMs described direct personal agency through expressing intentions and plans of action during interactions with other functions and leadership. However, for "those plans and actions to function it requires a commitment to a shared intention and coordination of interdependent plans of action" (Bandura, 2001) or intentions from those interacted with. PSM descriptions indicated functional, authority, and role ambiguity barriers that limited

shared intention and coordination, thereby diminishing the effects of direct agency (Themes 2, 3, and 7). However, this ambiguity also creates additional space for social learning to occur. Further, PSMs described adopting courses of action that were likely to produce positive outcomes (most helpful approach) and discard other approaches that were least useful (Theme 4). This aspect of direct agency is also consistent with the literature (Bandura, 2001). The role ambiguity that PSMs experienced with "uncertainty about their role expectations" (Katz & Kahn, 2003) and value incongruence relative to developing the team and developing interactions versus becoming an expert and accomplishing tasks come into play in social learning (Themes 6 and 7). Role ambiguity was also evident in the challenges that PSMs faced with limited authority across functions and organizations to execute their role responsibilities (Themes 2, 3, and 7). Role ambiguity diminishes self-efficacy in the learning and action process of social learning and limits the effectiveness of accomplishing tasks and persistence in engagement of challenges since "if they believe they have no power to produce results, they will not attempt to make things happen" (Bandura, 1997, p. 3).

PSMs also described modes of proxy agency through leveraging others' authority and team members' abilities and time to affect system changes (Themes 4 and 5). Their critical relationships (possibly at the expense of other interactions) were typically in those areas that provided the means to rapidly develop understanding and solutions or decisions, which is with the program manager or through expanding the net understanding of logistics impacts their product support team members dispersed throughout the program (Themes 4 and 5). The findings of this study are consistent with literature relative to agency and role ambiguity in social learning. PSMs are socially

learning through trial and error or as they go, which leads to increased risk, unsatisfactory outcomes in terms of readiness and cost, and occasionally letting the system simply fail to minimally achieve a common understanding of the issues across functions and organizations. However, PSMs have become adept at using their unique abilities in a system designed for maximum control and minimizing errors to leverage different views of the system, navigating structures in seeking shared meaning and reciprocating norms more conducive to desired outcomes. In effect, they are trying to increase the speed and volume of reciprocity in social learning, as depicted in Figure 5.3.

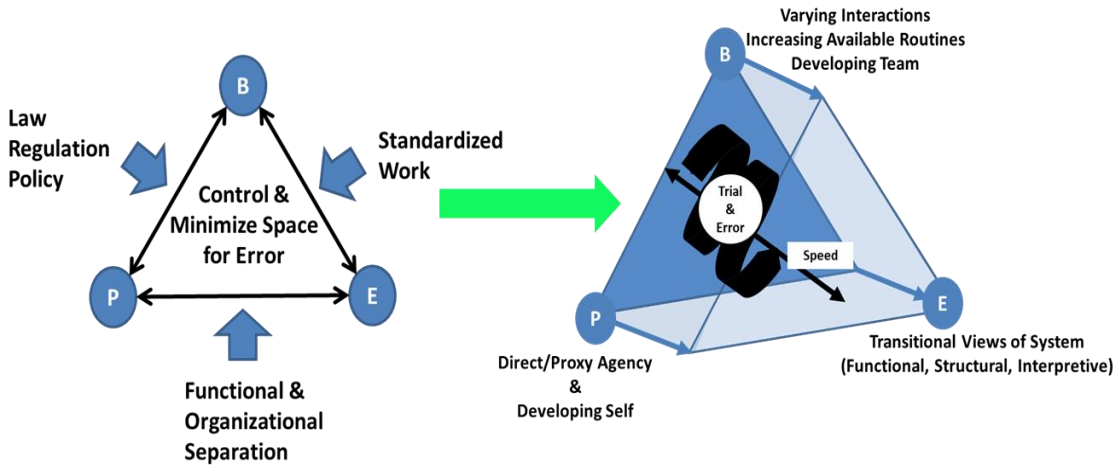

Figure 5.3. Increasing available space for social learning.

What is remarkable is that amidst the trial and error and environment of getting stuff done experienced by the PSMs, and likely all of the other functional roles that make up the collective effort of a program, the system is still able to absorb the nonoptimal solutions and errors that do occur without simply crashing. However, the results, and the understanding provided by the findings of the study, are consistent with professional literature (Charette, 2008; Eaglen, 2012; Gray et al., 2010) and numerous General

Accounting Office/Government Accountability Office (GAO) reports (GAO, 1981, 2003, 2004, 2005, 2006, 2007, 2008, 2009a, 2010, 2011, 2017) in this regard.

The findings are clearly interdependent, and therefore all options for improving social learning must be considered together to maximize social learning space, reduce risk, and enhance performance. Recommendations for theory, research, and practice are subsequently provided in an attempt to improve understanding and execution in these areas.

Recommendations

This section discusses recommendations for theory, research, and practice. These recommendations are based on the overall results of the study and the applicable literature with consideration of the limitations of both.

Recommendations for Theory

Sensemaking may be appropriate to further unpack how PSMs and others (intra/inter-organizationally and between them and their industry counterparts) are making sense of circumstances (environment) that then lead to particular behavior(s) by each participant. In effect, sensemaking places a microscope over the specific interaction taking place to understand how each participant learns as circumstances and meaning change. This lens would develop further insight into how the shared sensemaking affects the social learning process of each individual and changes the circumstances in the environment. In the same light, sensemaking as it relates to structuration might provide insight into how shared meaning is developed (signification), as each participant brings unique "institutional constraints, organizational premises, plans, expectations, acceptable

justifications, and traditions inherited from predecessors" (Weick, Sutcliffe, & Obstfeld, 2005, p. 409). It may also provide insight into how and why each participant decides to routinize their engagements (legitimation) toward further "elaboration of the flow of action" or decides when to leverage authority (power and domination) in search of a "substitute when there is not an intelligible way to proceed" (Weick et al., 2005, p. 409) by other means, particularly with this highly regulated system that has limited feedback. Specific areas where the integrated application of these theories might help provide a micro-level understanding of particular role responsibilities of the PSM are identified in the recommendations for future research.

The highly complex and structured system that PSMs operate in may provide fruitful ground to evaluate the concepts proposed by Schwandt and Szabla (2013) by seeking to understand how the relationships between PSMs' roles, routines, and actions interact with or change logistics practices (including standard work practices and checklists), requirements, and organizational structure and vice versa. In a larger context, it may be useful to develop the same understanding from the PSM or individuals within acquisition programs through the Department of Defense level where policies are generated.

Recommendations for Future Research

Two examples related to this study and PSM responsibilities involving the integration of making meaning and social learning or structuration may be useful to future research. They relate to longitudinal studies of how multiple participants across organizations experience or make sense of performance-based agreements and how PSMs

come to make sense with others over the course of adjusting product support arrangements and providers.

Researchers should also consider broadening the population studied. Consideration of PSMs in different environments and structures (i.e., U.S. Air Force, Special Operations) and where PSMs are separated as acquisition *or* sustainment (e.g., Naval Sea Systems Command) rather than having responsibility for programs in all phases of the life cycle simultaneously would be helpful in better understanding distinctions between strictly acquisition or strictly sustainment environments and also lead to more generalizable findings. Such studies would also help develop a more in-depth understanding of interactions and time spent doing mostly strategic planning versus more reactionary responding to emerging user needs for existing products.

Researchers should try to elicit a better understanding of the view of PSM roles and execution from the perspective of those mentioned in key interactions. This would provide additional in-depth understanding of how program managers, chief engineers, assistant program managers for logistics, and assistant program executive officers for logistics interact with PSMs and why. What do they believe PSMs' role to be and how do they perform or learn? Do they believe that PSMs are successful in their roles when provided a Section 2337 description? What could PSMs do differently?

Researchers should seek to better understand which policies PSMs perceive as valuable or not valuable. Most participants referred to policy other than law as being a guideline, but it was unclear as to what they thought was good or bad about the policies they had or what could make them more valuable to them in their role. Additionally, how acquisition law, policy, guides, and work practices can be structured in order to increase

the amount of available trade space to individuals (rather than with a view to control) within these complex systems to innovate or produce more desirable outcomes should be evaluated by researchers.

Additional research should seek to understand, via longitudinal study, how and why PSMs in current projects adjust interactions over time rather than considering snapshots in time for a single project.

Recommendations for Practice

This study offers empirical evidence for understanding how PSMs learn in complex environments. The findings and conclusions of this study may have benefits for practitioners, including those responsible for selecting, supervising, or developing PSMs. The findings from this study suggest implications for practice in eight areas.

1. Consider having regular meetings between PSMs whose primary systems are commodity-like or consumable (nonrepairable) and PSMs whose primary systems are large platform or complex repairable systems. Through such meetings, the PSMs could share experiences and gain practical appreciation of focusing more on influencing design early (for platform-level PSMs) and characterizing long-term potential impacts better (for commodity PSMs).

2. Consider leveraging the ‘cost and readiness playbook’ approach and intensity on the acquisition side to create a similar learning environment and emphasis that seems to be present on the in-service, real-time, support side. In other words, using similar processes and terminology, explore the possibility that program managers and PSMs could be coached into developing a strategy that progressively traces decisions through to

readiness and operational costs rather than unit procurement costs, which is a small part of the overall affordability position.

3. When developing policy or ‘standard’ work processes, better articulate intended outcomes or why a particular requirement or step produces a significant outcome. Further, it may be helpful to suggest alternatives related to ‘typical’ or expected pressures that might be experienced. Gather information to determine what would make standard work processes or policies more useful under varying program conditions. It may also be useful to pre-coordinate with other functions and organizations that are required to assist with execution of the process to aid in limiting role ambiguity or role conflict.

4. Consider training that approaches executing programs in more of a wargaming environment or “Fleet Problem” (Swift, 2018, p.22) that creates a more realistic operational environment and fruitful ambiguity through variance of role, task, and resource challenges, variance of interactions, and limited information and feedback paths. These problems could be based on current challenges faced by a program of PSM (rather than historical cases with checklists of tasks to be completed and set contexts) and exercise both intra- and inter-organizational roles (including industry) so that role players and policy makers alike can practice together, “in combination with multiple tasks, against free-playing, informed, and representative” (Swift, 2018, p.23) others. Failure and success points from these exercised scenarios could be further explored through various forums, which leads to the next three recommendations.

5. Consider evaluating current challenges using PSMs (and their industry counterparts on their programs versus marketing and business development functions) and other key stakeholders in a nonattribution, open forum at the annual PSM Workshop

hosted by the deputy assistant secretary of defense (materiel readiness). This would enable other PSMs (and their industry counterparts) to develop increased mutual understanding of necessary interactions in dynamic and unique circumstances while at the same time presenting additional 'problems' that could potentially be referred to other logistics professional organizations and academia for practical alternatives.

6. At the same PSM Workshop, engage academia to bring forward the latest research results applicable to current challenges as well as potentially investigate questions related to new challenges. The PSM Workshop advocates engagement between government, industry, and academia but rarely holds significant engagement opportunities or forums with industry product support leads within programs or academia outside of the Defense Acquisition University.

7. Consider 'Industry Days' or equivalent forums that host various outside logistics professional organizations or refer challenges to them in order to both routinize communication and understanding and discuss challenges in a non-convention-like or non-sales environment. While PSMs were not engaged without outside professional organizations, they generally believed them to be of value in terms of increased functional or role knowledge. The value may increase if PSMs and these organizations were brought together to develop a common understanding of how they might help each other. Potential organizations are identified in Table 5.2.

8. Consider ways to expand the comprehension of complex systems language and terminology as a way to enhance interactions and collaboration across functions as a unified group. PSMs and other functional areas within the organization clearly understand basic systems concepts of input, transformation, output, and feedback but have minimal

common understanding of other concepts such as emergence, adaptation, differentiation, and path dependence related to the behavior of the complex systems they live in.

Table 5.2
Examples of Outside Professional Logistics Organizations and Potential Engagement Opportunities

Professional organization	Potential engagement
Military Operations Research Society	Affordability analyses; wargaming and analysis communities of practice
Society of Automotive Engineers International	Life Cycle Logistics Supportability Committee; development of logistics-related standards
Council of Supply Chain Management Professionals	Industry logistics certifications
National Defense Industrial Association	Logistics Division – National Logistics Forum
Council of Logistics Engineering Professionals	Lunch and learn sessions and logistics symposiums.
International Society of Logistics Engineers	Industry logistics certifications
American Production and Inventory Control Society	Industry logistics certifications and supply chain operations reference model
Logistics Officer Association	Association symposium
Academy of Management	Operations and Supply Chain Management Division – research on new product development and logistics
American Institute of Aeronautics and Astronautics	Product Support Technical Committee
Aerospace Industries Association	Product Support Committee and Product Support Integrator Workshop

Limitations

Several limitations relate to the data that were not gathered. For example, many PSMs addressed feedback from ‘outside NAVAIR’ as other Department of the Navy subordinate or systems command organizations. It would have been helpful if the PSMs had specifically addressed levels outside systems command (NAVAIR) but within service (at the Department of the Navy level—assistant secretary of the Navy for

research, development and acquisition) and Department of Defense levels so that data were available from higher levels.

Several additional probes would have been useful in the interview protocol to inquire about (1) what was most useful for understanding PSMs' role, to gain additional data and insight as to whether it was policy or relationships; (2) what learning or significant events they experienced, to address more specifically what they believed the outcome (positive or negative) to be in terms of cost, schedule, or readiness/performance and what they might have done differently to change or influence the outcome; and (3) what would make standardized work practice documentation or training more useful to execution under varying program conditions or scenarios.

Relative to the cognitive complexity addressed in the operationalized conceptual frame (Figure 1.4), the data were inconclusive. While a few projects and challenges described by participants were in near-term contexts, anywhere from 6 months to 5 years, neither I nor the participant pursued further descriptions of time relative to specific projects in enough detail to gain a generalizable understanding of participant time horizons in project planning. However, I believe this remains an area worthy of further exploration to better understand potential cognitive constraints of an individual while developing a shared understanding of logistics impacts that could potentially be decades from project inception or decisions. Additionally, insight into time horizons could provide a better understanding of the value of the 5-year mandate for reevaluating business cases in law, as well as policy-related audits (i.e., independent logistics assessments) or life cycle sustainment plan revisions.

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APPENDIX A:

RECRUITMENT MATERIALS FOR REFERRAL SOURCES

The enclosed letter is being sent to you as a request to assist with my dissertation research. I am asking for your help in identifying potential participants for a study to explore the nature of the social learning process within complex acquisition programs as described by Product Support Managers (PSM) currently assigned to acquisition programs within the Naval Air Systems Command. Specifically, I want to understand the reciprocal influences embedded within these acquisition programs as PSMs seek to achieve fiscally sustainable and high-performance projects. Secondarily, this research will explore the effect of individual values and structure on social learning processes within complex acquisition programs. Participation in this research study will be on a voluntary basis with the right to withdraw from the study at any time. I would greatly appreciate your thoughtful consideration.

Thank you.

Joseph B. Davis Jr

Enclosure: Referral Letter with Research Study Overview attachment

Date

Recipient
Title
Address

Dear Name:

As an individual with many years of experience in leading product support management and supervising Product Support Managers (PSM) within the Naval Air Systems Command, I am asking for your help in identifying 8-12 PSMs who are currently serving within that role in acquisition programs. Participation in this research study will be voluntary with the right to withdraw from the study at any time.

Potential participants must be individuals that have two or more years of experience as a Product Support Manager or equivalent role and be currently serving in a PSM role within a program office. Additionally, half of the participants should be currently assigned to Acquisition Category (ACAT) I or ID programs (larger and more complex programs) and half should be currently assigned to ACAT II or III programs (less complex). Lastly, the list of participants should be provided in rank order of most experienced to least experienced.

A summary of the research study is attached.

Please do NOT contact any potential study participants. The methodology I am using requires that I make all contact. If you can help by identifying potential participants who meet the criteria described in this letter, please e-mail me as soon as possible with the individual's name and contact information.

Thank you in advance for your assistance.

Sincerely,
Joseph B. Davis Jr

Attachment: Research Study Overview

Research Study Overview

Title: Social Cognition Within Complex Systems:
A Descriptive Case Study of How Product Support Managers
Experience Public-Sector Defense Acquisition Environments

Purpose of the Study: The purpose of this research is to explore the nature of the social learning process within complex acquisition programs as described by Product Support Managers currently assigned to acquisition programs within the Naval Air Systems Command. Specifically, the researcher wants to understand the reciprocal influences embedded within these acquisition programs as PSMs seek to achieve fiscally sustainable and high performance projects. Secondarily, this research will explore the effect of individual values and structure on social learning processes.

Problem Addressed: Across the Department of Defense (DoD), Product Support Managers (PSM) are faced with increasingly complex environments that challenge their ability to effectively plan and execute product support strategies for acquisition programs. The problem addressed by this study is the minimal evidence-in-depth that exists for understanding how a PSM experiences a complex acquisition system, particularly in acquisition logistics contexts, with significant social and structural influences.

Significance of the Study: The results from this study should help shape the efficiency and effectiveness of Product Support Managers and future Government acquisition programs by uncovering key social learning aspects of these individuals within current complex environments.

Participants Sought for the Study: Participants are being referred by senior executives with the Naval Air Systems Command who are responsible for managing individuals serving as Product Support Managers. Participants will be asked to submit a resume describing their background and the organizations where they have worked and to participate in three 60- to 90-minute interviews. The interviews will explore three main areas: (1) responsibilities and views regarding product support management and complex environments; (2) recollection and reconstruction of experiences; and (3) reflections on those experiences. The interviews will be digitally audio-recorded and transcribed. Participants will have the opportunity to review the transcripts and make corrections for accuracy. The dissertation may be published, as may articles that relate to the findings. Findings may also be presented at conferences or other educational programs. At no time will any individual participant or their organization be identified. Data will be reported anonymously (e.g., “one participant said” or “participant 3 said”).

About the Researcher: Joseph B Davis Jr. is a doctoral candidate in the Executive Leadership Doctoral Program of the Graduate School of Education and Human Development of The George Washington University in Washington, DC. Professionally, Joe has served in and with the Department of Defense (DoD) for over 35 years as a logistician, manager, and leader working across a broad cross-section of commercial industry and DoD systems acquisition and support processes. He is currently serving as a support contractor to the Naval Air Systems Command assisting in the development of product support strategic plans, programs, processes, and execution of current acquisition programs. Joe hopes this study will add to the body of knowledge regarding how Product Support Managers learn and act within complex acquisition environments and provide insights to help improve the practice of product support management, and as a result, long-term sustainment of acquisition products.

APPENDIX B:

RECRUITMENT MATERIALS FOR POTENTIAL PARTICIPANTS

Date

Recipient
Title
Address

Dear Name:

You have been identified by naval aviation leadership as an individual who has had the opportunity to perform as a Product Support Manager in complex environments. It has been suggested that you might be a candidate for participation in my doctoral research study to explore the nature of the social learning process within complex acquisition programs as described by Product Support Managers currently assigned to acquisition programs within the Naval Air Systems Command. Participation in this research study is on a voluntary basis, and you will have the right to withdraw from the study at any time.

The attached summary provides a brief description of my research study. My dissertation is being completed through the Executive Leadership Doctoral Program of the Graduate School of Education and Human Development of The George Washington University in Washington, DC. I will give your office a call in a few days to see if you would like to participate or discuss the study further. Or, you may contact me directly before I call. I thank you for any consideration you give this study and look forward to speaking with you.

Sincerely,
Joseph B. Davis Jr.

Enclosure: Research Study Overview

Research Study Overview

Title: Social Cognition Within Complex Systems:
A Descriptive Case Study of How Product Support Managers
Experience Public-Sector Defense Acquisition Environments

Purpose of the Study: The purpose of this research is to explore the nature of the social learning process within complex acquisition programs as described by Product Support Managers currently assigned to acquisition programs within the Naval Air Systems Command. Specifically, the researcher wants to understand the reciprocal influences embedded within these acquisition programs as PSMs seek to achieve fiscally sustainable and high performance projects. Secondarily, this research will explore the effect of individual values and structure on social learning processes.

Problem Addressed: Across the Department of Defense (DoD), Product Support Managers (PSM) are faced with increasingly complex environments that challenge their ability to effectively plan and execute product support strategies for acquisition programs. The problem addressed by this study is the minimal evidence-in-depth that exists for understanding how a PSM experiences a complex acquisition system, particularly in acquisition logistics contexts, with significant social and structural influences.

Significance of the Study: The results from this study should help shape the efficiency and effectiveness of Product Support Managers and future Government acquisition programs by uncovering key social learning aspects of these individuals within current complex environments.

Participants Sought for the Study: Participants are being referred by senior executives with the Naval Air Systems Command who are responsible for managing individuals serving as Product Support Managers. Participants will be asked to submit a resume describing their background and the organizations where they have worked and to participate in three 60- to 90-minute interviews. The interviews will explore three main areas: (1) responsibilities and views regarding product support management and complex environments; (2) recollection and reconstruction of experiences; and (3) reflections on those experiences. The interviews will be digitally audio-recorded and transcribed. Participants will have the opportunity to review the transcripts and make corrections for accuracy. The dissertation may be published, as may articles that relate to the findings. Findings may also be presented at conferences or other educational programs. At no time will any individual participant or their organization be identified. Data will be reported anonymously (e.g., “one participant said” or “participant 3 said”).

About the Researcher: Joseph B Davis Jr. is a doctoral candidate in the Executive Leadership Doctoral Program of the Graduate School of Education and Human Development of The George Washington University in Washington, DC. Professionally, Joe has served in and with the Department of Defense (DoD) for over 35 years as a logistician, manager, and leader working across a broad cross-section of commercial industry and DoD systems acquisition and support processes. He is currently serving as a support contractor to the Naval Air Systems Command assisting in the development of product support strategic plans, programs, processes, and execution of current acquisition programs. Joe hopes this study will add to the body of knowledge regarding how Product Support Managers learn and act within complex acquisition environments and provide insights to help improve the practice of product support management, and as a result, long-term sustainment of acquisition products.

APPENDIX C:

TRANSCRIBER'S LETTER OF CONFIDENTIALITY

I understand that I have been asked to listen to and transcribe the content of interview tapes for research related to a doctoral dissertation. I agree to maintain confidentiality regarding the information heard on the digital audio recordings and the contents of the discussion.

Furthermore, I will not make any copies of the tapes I have transcribed and will return them with the transcription.

Researcher	Transcriber
Date	Date

APPENDIX D:

INTERVIEW GUIDE

Interview 1

Objectives: Review and sign consent form. Build rapport. Review the purpose of the study and an overview of the process. Request a resume describing the participant's background and organizations where they have worked as well as any information regarding their program's current internal and external organizational structure (i.e., organizational chart or life cycle sustainment plan). Establish time and place for next meeting. Develop an understanding of the participant's view of the role of a product support manager and some of the basic challenges or opportunities.

Notes: This interview will follow receipt of the participant's completed informed consent form (Appendix E). Provide a list to the participant of responsibilities of product support managers identified in USC Title 10, Section 2337. This will be a face-to-face interview.

Questions:

1. Do you have any questions about the purpose of the study?

2. Can you provide me your resume?

3. Can you provide me some information on your team and program organizational structure such as organizational charts or a life cycle sustainment plan?

4. How would you describe your role as a product support manager?
   Probes: Can you describe any significant changes in your responsibilities during your tenure? Can you describe significant challenges or opportunities created due to this change? How did you come to a better understanding of the challenge or opportunity due to this change? What or who helped you gain a better understanding of the challenge or opportunity to either overcome or take advantage of this change?

5. Of your responsibilities under United States Code Title 10, Section 2337, can you describe any significant learning opportunities during the course of trying to perform them?
   Probes: What was the most helpful in your understanding and why? Who was most helpful in your understanding and why?

Thank you for your time today.

Leave empty notebook with participant to record any thoughts in between interviews.

Interview 2

Objectives: Continue building rapport, gain information about the participant's past and context, and understand the dynamic social learning process as he or she develops and executes options during the acquisition or production phases of a complex program.

Notes: This will be a face-to-face interview. I will have the participant's resume and background on the organizations where he or she has worked.

Questions:

1. Do you have or have you had any affiliations with external logistics or other professionally oriented organizations? Are there any you're familiar with that you think might be helpful to you in your role as a PSM?

2. Having held a number of positions and having those experiences, what stands out as the one experience that has prepared you the most as a PSM? Why?

3. Please tell me about some of your previous positions that led you to your current position.
   Probes: Can you describe some of the significant experiences of these positions with respect to key relationships, objectives you had to achieve, or decisions you had to make? In reflecting upon these experiences, can you share with me who or what influenced you the most in how you performed your work? Did the environment or team members allow for the exploration of ideas or alternatives? How did your role shape the discussion or decisions involved?

4. How would you describe your current environment that you are developing product support strategies or plans in?
   Probes: How do you define success in your role or in accomplishing your work? How do you feel about that? How do you determine what the critical relationships, processes, activities, and timelines are in achieving your objectives? What guidance, rules, or policy influence your environment or how you do your work? What do you think about that?

5. Can you share with me two or three key projects or events that you have been a part of in your current role—in particular, any novel moments when you perceived a critical choice or decision needed to be made or you were instrumental in developing or changing a course of action to prevent a detrimental outcome for the program?
   Probes: With whom did you primarily interact, within your team, within your program, or external to the program and why? How did you interact (e.g., via meetings, phone call, e-mail)? How did you have to adjust your interactions or approach based on feedback or ways other individuals responded? Were there individuals that encouraged input or not? Was there an individual or guidance that was particularly helpful in exploring or discovering different or better alternatives

to approaching the choice or decision? What was the time horizon between when the event occurred or the decision needed to be made and realizing the outcome or effects?

6. Assume it is 10 years from now and your team or program is featured as an exemplar for how acquisition programs should function because of the team's ability to create a new way of working with each other in order to produce effective, efficient, and affordable product support. What would the executive summary of that story be? Who would be the key individuals internal or external to the program? What would they need to do, when would they need to do it, and where would the interactions take place and how? What would the title of that story be?

I am going to send you a copy of the transcription from our interview for you to review and validate for accuracy. We need to be sure that everything accurately reflects your responses. Please review the transcription before our next meeting. I will schedule a meeting with you to discuss any changes you may have and may have a few questions for clarification during that meeting. I am also leaving you with a notebook to make note of any additional thoughts or additional events you may want to discuss after reflecting on our discussion today.

Thank you for your time today.

Interview 3

Objectives: Obtain feedback on transcription from Interview 2. Obtain clarification on items from Interview 2 if needed. Determine if there any additional thoughts or events the participant would like to discuss.

Notes: This will be a face-to-face interview. For any additional events the participant would like to discuss, the probes from Interview 2, Question 3 will be used. For any additional events, an updated transcript will be sent to the participant for review of the new items.

Questions:

1. Did you have any changes to the transcription from either of the previous two interviews?

2. Open with about 2 minutes of feedback to participant from previous interviews to relay some context and understanding by the interviewer, particularly as it relates to potential value orientations. (Note: Feedback and context relayed will vary by participant. As an example, "During our previous discussions, it appeared that you are dealing with multiple environmental and individual conflicts, particularly in terms of values. For example, . . ."

3. What values sustain you or hold you together in your current environment? Do you feel that the organization has or shares those values? Why or why not? Why did you or do you stay in the PSM job?

4. At three different levels—outside NAVAIR, within your program, and within your team—as the PSM what have you found is the most important relationship at each of those levels and why?

5. What has been the most challenging thing you've had to figure out as the PSM? What proved to be the most helpful to you in doing that? The least helpful?

6. I'd like to discuss feedback for a moment. How do you get feedback in your current environment and from other people? Can you tell me why it's important? Do you get enough feedback? What has been the most useful feedback you've received as a PSM? What has been the least useful feedback?

7. What should I have asked about how you as a PSM learn in this complex environment that I did not ask? What didn't I ask about how you learn?

8. Since our last meeting, are there any additional thoughts or events that would be interesting for me to know about?
   Probes for additional events: With whom did you primarily interact, within your team, within your program, or external to the program and why? How did you

interact (e.g., via meetings, phone call, e-mail)? How did you have to adjust your interactions or approach based on feedback or ways other individuals responded? Were there individuals that encouraged input or not? Was there an individual or guidance that was particularly helpful in exploring or discovering different or better alternatives to approaching the choice or decision? What was the time horizon between when the event occurred or the decision needed to be made and realizing the outcome or effects?

Thank you for your time today and for participating in this study.

APPENDIX E:

INFORMED CONSENT FORM

Research Study: Social Cognition Within Complex Systems:
A Descriptive Case Study of How Product Support Managers
Experience Public-Sector Defense Acquisition Environments

IRB # 071638

Investigator: Joseph B. Davis Jr.
Telephone Number: 817-xxx-xxxx
Faculty Sponsor: Dr. David Schwandt
Telephone Number: 703-xxx-xxxx

I. INTRODUCTION

You are invited to take part in a research study. Before you decide to be a part of this study, you need to understand the risks and benefits. This consent form provides information about the research study. I will be available to answer your questions and provide further explanations. Your decision to take part in the study is voluntary. You are free to choose whether or not you will take part in the study. Participation or nonparticipation will not affect working status.

II. PURPOSE

As a doctoral student in the Graduate School of Education and Human Development of The George Washington University, I am carrying out a research study to understand the social learning of Product Support Managers in complex environments.

III. PROCEDURES

The research will be conducted at a location of your choice. You will be asked to provide a resume describing your background and organizations where you have worked and to participate in three 90-minute interviews. The interviews will explore three main areas: (1) your roles, responsibilities, and any significant changes or learning events during your tenure as a Product Support Manager; (2) your recollection and reconstruction of experiences; and (3) your reflections on those experiences. As part of the interview process, you will work with me to review the transcripts for accuracy. You may also record, in a notebook provided, any thoughts relevant to this study that occur between interviews. The interviews will be digitally audio-recorded and transcribed. You will have the opportunity to review the transcripts and make corrections for accuracy. The dissertation may be published, as well as articles that relate to the findings. Findings may also be presented at conferences or other educational programs. At no time will you or your organization be identified. Data will be reported anonymously (e.g., “one PSM said” or “PSM 3 said”).

IV. POSSIBLE RISKS
The things you will be doing for the study present no more risk to you than you would experience in everyday life.

V. POSSIBLE BENEFITS
You will not get any tangible benefits from taking part in this study. As a result of participation, you may have an increased understanding of how you learn and interact within complex environments.

VI. COSTS
There are no costs to you for taking part in this study.

VII. COMPENSATION
You will not receive compensation for participating in this study.

VIII. RIGHT TO WITHDRAW FROM THE STUDY
Your participation in this study is voluntary. You may decide not to begin or to stop your participation at any time.

IX. CONFIDENTIALITY AND PRIVACY OF RESEARCH RECORDS
Your records will be private. No one will know except for me that you are a part of this study. An alphanumeric identifier will be used during interview recording. The transcription will identify you by this alphanumeric identifier. Only I will be able to associate your full name with your number. No classified information is to be discussed during the interviews. Your records may be provided to authorized representatives of The George Washington University Office of Human Research and/or Committee on Human Research. Except for these entities, research records will be kept confidential unless you authorize their release or unless the records are required to be released by law (i.e., court subpoena). You will not be identified by name in any reports or publications of this study. The digital audio recordings, and any notes we take, will be stored in a locked file cabinet in my office, which only I will have access to. I will destroy all identifiable documents within 2 years of successful defense of the dissertation.

X. QUESTIONS
If you have any questions about this study, please call me at 817-xxx-xxxx at any time. If you have complaints about participating, please call the George Washington University Office of Human Research at 202-994-2715.

XI. RESEARCHER STATEMENT
I certify that I have explained the research study to the above individual, including the study's purpose, procedures, possible risks, and potential benefits. Any questions raised have been answered to the individual's satisfaction.

Joseph B. Davis Jr. _____
Investigator Signature/Date

_____ _____
Participant Name Signature/Date

APPENDIX F:

MATRIX LINKING INTERVIEW QUESTIONS TO CODES

Research questions	Interview question aspect	First-cycle structural codes	Second-cycle codes (subaspects of structural codes and variance)
How do PSMs describe the dynamic social learning process as they develop and execute their responsibilities during the acquisition and production phases of a complex program?	Describing their role	Role	Role aspects
	Describing their environment	Environment	Environment aspects
	Describing interactions and projects in environment	Role challenges Interactions	System views
	Describing their most significant relationships	Critical relationships Interactions	Structure aspects
	Describing interactions with other professional organizations	Interactions	Structure aspects
	Describing feedback	Interactions	Structure aspects
What effect do an individual's values and environment have in this social learning context?	Describing their environment	Environment	Structure aspects and value orientation
	Describing interactions with other professional organizations	Level of helpfulness in their role	Value orientation
	Describing their most significant relationships	Why the relationships are critical	Value orientation
	Describing values that sustain them in the current environment	Values	Value orientation
	Describing whether values are shared	Values	Value congruency
	Describing feedback	Level of helpfulness	Structure Value orientation
	Describing future success	Values	Value orientation
How do PSMs describe the changing nature of their social learning?	Describing interactions and projects in environment	Significant changes or challenges	System views Structure aspects
	Describing their role	Significant changes or challenges	System views Structure aspects
	Describing future success	Significant changes	System views Structure aspects

APPENDIX G:

PRODUCT SUPPORT MANAGER RESPONSIBILITIES

(U.S. Code Title 10, Subtitle A, Part IV, Chapter 137, Section 2337)

- Develop and implement a comprehensive product support strategy for the weapon system.
- Use appropriate predictive analysis and modeling tools that can improve material availability and reliability, increase operational availability rates, and reduce operation and sustainment costs.
- Conduct appropriate cost analyses to validate the product support strategy, including cost-benefit analyses as outlined in Office of Management and Budget Circular A–94.
- Ensure achievement of desired product support outcomes through development and implementation of appropriate product support arrangements.
- Adjust performance requirements and resource allocations across product support integrators and product support providers as necessary to optimize implementation of the product support strategy.
- Periodically review product support arrangements between the product support integrators and product support providers to ensure the arrangements are consistent with the overall product support strategy.
- Prior to each change in the product support strategy or every five years, whichever occurs first, revalidate any business-case analysis performed in support of the product support strategy.
- Ensure that the product support strategy maximizes small business participation at the appropriate tiers.
- Ensure that product support arrangements for the weapon system describe how such arrangements will ensure efficient procurement, management, and allocation of Government-owned parts inventories in order to prevent unnecessary procurements of such parts.