Acquiring Expertise? Developing Expertise in the Defense Acquisition Workforce

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ABSTRACT

The goal of this research project is to tell the story of acquisition expertise development within the DOD using the evolution of the Defense Acquisition University as its backdrop. It is a story about the persistent frame that claims expertise leads to acquisition success. It is about 40 plus years of competing perspectives of how best to acquire that expertise and their shaping effects. It is about technology choices amidst cultural and political conflict. It is about how budget, users, infrastructure, existing and emerging technologies, identity and geography all interrelate as elements within the technology of expertise development. Finally, it is about how at various times in the evolution of the Defense Acquisition University the technologies of tacit knowledge transfer have been elevated or diminished.

Dedication

For Sonya. Without your support and sacrifice I could not have succeeded. All my love.

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List of Abbreviations

ACC	Acquisition Community Connection
ACE	Acquisition Career Enhancement
ADOMA	Associate Dean for Outreach and Mission Assistance
AET&CD	Acquisition Education, Training and Career Development
AFB	Air Force Base
AFIT	Air Force Institute of Technology
ALM	Acquisition Learning Model
APMC	Advanced Program Management Course
AT&L	Acquisition Technology and Logistics
AWQI	Acquisition Workforce Qualification Initiative
BOV	Board of Visitors
C2Q	Certification to Qualification
CDSC	Curriculum Development Support Center
CLM	Continuous Learning Module
CNE	Capital and Northeast
CON	Contracting
CoP	Community of Practice
DACM	Director, Acquisition Career Management
DAG	Defense Acquisition Guidebook
DAS	Defense Acquisition System
DAU	Defense Acquisition University
DAW	Defense Acquisition Workforce
DAWIA	Defense Acquisition Workforce Improvement Act
DDR&E	Director, Defense Research and Engineering
DL	Distance Learning
DMR	Defense Management Review
DOD	Department of Defense
DSMC	Defense Systems Management College
DSMS	Defense Systems Management School
DWSMC	Defense Weapon Systems Management Center
ERC	Executive Refresher Course
FA	Functional Advisor
FIPT	Functional Integrated Product Team
GAO	General Accounting Office or Government Accountability Office
GCCU	Global Consortium of Corporate Universities
HQ	Headquarters
IPT	Integrated Product Team or Integrated Process Team
MA	Mission Assistance
MAKR	Mission Assistance and Knowledge Repository
NPS	Naval Postgraduate School
OSD	Office of the Secretary of Defense
PBD	Program Budget Decision
PGC	Policy Guidance Council

List of Abbreviations Continued

PLM	Performance Learning Model
PMC	Program Managers Course
PWS	Performance Work Statement
RBA	Revolution in Business Affairs
SAE	Service Acquisition Executive
SAW	Services Acquisition Workshop
SME	Subject Matter Expert
SPM	School of Program Managers

Chapter 1

Introduction

Early in the spring of 2013, the combined faculty and staff of the Defense Acquisition University (DAU) gathered in the video teleconference centers at each of its five regional campuses and their subordinate off-site teaching centers. This gathering was one of many such "All-Hands" meetings that had been convened over the past decade. Officiating from Scott Auditorium at Fort Belvoir, Virginia, the acting president of the DAU, Dr. James McMichael made a notable presentation. He called Dr. Christopher Hardy, the Director of DAU's Global Learning and Technology Center onto the stage and asked Dr. Hardy to accept, on behalf of the entire faculty and staff, the Gold Award from the Global Council of Corporate Universities (GCCU). The GCCU had just named DAU the world's best corporate university for 2013.[1] The DAU earned this award for performing its mission to train and develop the expertise of the defense acquisition workforce.

This vignette raises a number of questions: What is the Defense Acquisition Workforce? Why does it need expertise? What does it mean to possess acquisition expertise? What technologies are involved in developing acquisition expertise? How did they evolve?

What is the Acquisition Workforce?

The Defense Acquisition Workforce is the collection of multi-disciplined employees who work to develop, acquire, and sustain defense systems such as tanks, airplanes, ships and

[1] GCCU is an association with a world-wide membership. It promotes the corporate university model as a means for life-long, cooperative learning. The 2013 awards ceremony was held at the Microsoft France Headquarters in Paris.

information systems. They work as physicists, engineers, contracting specialists, financial analysts, program managers, and in a number of other specialties. A number of the systems designed and built by this workforce have been studied as complex socio-technical systems. Donald McKenzie's treatment of nuclear missile guidance systems *Inventing Accuracy* is an example. This study examines the development of the expertise required to acquire such systems for the United States Department of Defense (DOD) as a socio-technical phenomenon. But why does expertise matter?

Why does the DOD need acquisition expertise?

There is a long-held, popular view within the DOD acquisition community that success of acquisition programs hinges on the quality and expertise of the acquisition workforce members. This perspective was expressed in the 1971 policy document that first described the DOD's formal acquisition process: "Successful development, production and deployment of major defense systems are primarily dependent upon competent people, rational priorities, and clearly defined responsibilities." In this research project I equate "competent" with possession of the expertise requisite to positively influence acquisition outcomes. If, in fact, acquisition expertise does influence acquisition outcomes what is its import?

The success or failure of DOD acquisition programs impacts the military and economic security of the United States. The DOD spends tens of billions of dollars every year in the acquisition of weapons and other related defense systems, and too often these acquisition programs fail to deliver the desired military capability on schedule or within budget. In some instances, no capability is delivered at all. Between 2001 and 2012, twelve major defense programs were cancelled without delivering any capability after spending a total of $46.1 billion in taxpayer dollars (Harrison 2012, 35). This number represents an almost 15% cancellation rate

for high dollar, high capability programs. These types of acquisition mishaps drain the country's coffers and leave the military less capable. It is the DOD's goal to develop the expertise needed to execute all acquisition programs within budget and on schedule. So what is this thing that affects national security? What is acquisition expertise?

What does it mean to possess acquisition expertise?

To possess acquisition expertise does mean to be able to execute successful acquisition programs. That is to say, deliver the needed defense capability on schedule and within budget. In this study I conducted personal interviews with current and former members of the faculty and staff of the Defense Acquisition University. I also interviewed other defense department employees that have vested interests in the development of expertise in the acquisition workforce. I asked these study participants to describe what it meant to be a competent member of the acquisition workforce or to possess acquisition expertise. Their responses pointed to the aforementioned ability to contribute to positive acquisition outcomes, but also described components or sources of expertise.

Several participants focused on the outcome based description of acquisition expertise: "In the simplest terms it means you can meet cost, schedule and performance" (Study Participant 002 2013). "You have to have the knowledge, skills and abilities to execute and manage whatever piece of the acquisition you are responsible for" (Study Participant 001 2013).

Beyond being defined by the desired outcome, acquisition expertise is viewed by many study participants as having distinct components. One component is expertise within ones own designated discipline: "First and most important is skill in your own domain" (Study Participant 017 2014). "…technically aware…know your functional area" (Study Participant 005 2013).

Another component identified during the interviews was expertise in general defense acquisition policies and procedures: “I think all DAW [Defense Acquisition Workforce] types should have a fundamental knowledge of the acquisition process as in the 5000.02 [the DOD policy that describes its acquisition process] and their Service policies. That’s jacks or better no matter what career field” (Study Participant 008 2013).

Study participants also identified experience as an important component of acquisition expertise: “Have skill and proficiency…separate from the knowledge piece – more than ‘oh, I’ve read about that’” (Study Participant 006 2013). “It has two parts: technical experience and knowledge and leadership knowledge and experience” (Study Participant 007 2013). “You must have experience, nothing replaces experience” (Study Participant 017 2014). They must have experience and experiences...depth and breadth” (Study Participant 001 2013). “Know how to actually manage people and manage a contract…skills that make you productive…right now these are gained through experience at best…[through] unintentional experiential knowledge – not even planned” (Study Participant 009 2013). “To be effective in a rule based environment you need to know what rules you can break…to get an acquisition person to know that is hard…needs experience” (Study Participant 003 2013).

Other study participants added descriptions of what capabilities competence or expertise provide to members of the acquisition workforce: “Able to make good judgments within the acquisition processes and be able to advise superiors” (Study Participant 005 2013). “Needs critical thinking skills…have a rationale way of choosing alternatives and be able to change mind when facts change” (Study Participant 003 2013).

Lastly, the responses from study participants mentioned that expertise means possessing the ability to collaborate and execute group work: “You have to be able to communicate and work in a team” (Study Participant 014 2014).

These comments show the perceived link between expertise and successful acquisition outcomes. They also convey components of expertise such as a basic knowledge of the acquisition process that can be gained by reading a textbook, policy document or regulation, or by listening to a lecture. However, they also illuminate the role that experiential, tacit knowledge plays in expertise -- enabling acquisition workers to be productive and exercise sound judgment. So how does the DOD build acquisition expertise?

The Technology of Acquisition Expertise Development

The development of acquisition expertise within the DOD is a socio-technical phenomenon with the Defense Acquisition University (DAU) as its principal technology. The DAU is the statutorily mandated provider of acquisition training. It is now a nationally and internationally recognized leader in corporate training and learning technologies. In addition to the GCCU award mentioned in the opening vignette, the United States Distance Learning Association, the Corporate Learning Network, and the American Society of Training and Development have all recognized the DAU with their respective top awards. (Appendix A contains a complete list of the DAU’s awards)

Other Research Regarding Acquisition Expertise Development

A number of DOD studies have focused on how the Defense Acquisition Workforce can be made more expert so that they are effective and efficient in their decision-making. Over the past 40 years, the Congress, General Accountability Office, and the Department of Defense (DOD) have conducted studies with topics that ranged from exploration of the organizational and

reporting structure of acquisition organizations to attempts at determining the optimal number of DOD workforce members. Other government-sponsored studies, such as the 1986 Packard Commission Report and the 1989 Defense Management Review, identified the need for specialized training and education for the Defense Acquisition Workforce (Layton 2007, 24). These studies were sometimes expressions of perspectives on expertise development but they did not analyze impacts to the existing socio-technical structure.

To date, no known study has investigated how the DAU came to embrace its mix of learning technologies and their impact on tacit knowledge transfer from a sociological perspective. In *Leading a Learning Revolution* Anderson, Hardy and Leeson discussed the transformative efforts undertaken by the DAU between 1999 and 2009 primarily from a strategic organizational change management perspective. The work does describe some of the cultural upheaval associated organizational change. However, Anderson and Hardy were architects of the DAU's change management strategy. Their account is not unbiased and is told exclusively from the view of top-level management. They did not address tacit knowledge transfer as a component of expertise. David Acker wrote an organizational and leadership history of DAU's predecessor organizations from 1962 to 1989 simply titled *The Defense Systems Management College*. He did provide detail on some on learning technologies. Specifically, he recounted the origins of an early effort at simulating an acquisition program in a classroom environment. His history ends before the establishment of the DAU. Evelyn Layton's work, *The Defense Acquisition University: Training Professionals for the Acquisition Workforce 1992-2003* covers the history of the DAU during the mentioned timeframe. Like Acker, her treatment is primarily an organizational and leadership history. However, Layton focused on the political decisions surrounding the establishment and organization of the DAU. Additionally, she briefly touched

on the impact of computer technology on the DAU's approach to teaching and learning. These discussions of DOD's efforts to develop acquisition expertise provided valuable organizational histories, but little insight into the DAU's learning technology. They treated learning technologies and organizations largely as separate versus interconnected entities. These works left the processes for technology choices and closure unexplored. These treatments also did not address the role of experiential, tacit knowledge as a component of acquisition expertise.

Research Goals

The goal of this study is to tell the story of acquisition expertise development within the DOD using the evolution of the DAU as its backdrop. It is a story about the persistent frame that claims expertise leads to acquisition success. It is about 40 plus years of competing perspectives of how best to acquire that expertise and their shaping effects. It is about technology choices amidst cultural and political conflict. It is about how budget, users, infrastructure, existing and emerging technologies, identity and geography all interrelate as elements within the technology of expertise development. Finally, it is about how at various times in the evolution of the DAU the technologies of tacit knowledge transfer have been elevated or diminished.

Limitations of the Research

This research is limited to examining the learning technologies of the DAU and its predecessor institutions. The study acknowledges the role of education in developing acquisition expertise, but intentionally focuses solely on the learning technologies used in training conducted by the DAU. While this study deals with how the expertise required to operate the U.S. Defense Acquisition System (DAS) is developed, it is not does not address the efficacy of past or current versions of the Defense Acquisition System itself.

Analytical Frameworks

This research explores the development of acquisition expertise as a socio-technical phenomenon using the Social Construction of Technology (SCOT) as a primary framework. It focuses on the role of training in developing acquisition expertise.

More specifically the research focuses on the evolution of learning technologies employed by the DAU to conduct training and their potential for disseminating tacit knowledge. Learning technologies in the context of this research are not limited to pedagogical approaches or knowledge content, but rather are inclusive of organization structures, registration systems, policies, and infrastructure.

The study treats formally established DOD stakeholder groups involved in the shaping of DAU's learning technologies as SCOT relevant social groups equivalents. Through a thorough SCOT analysis this research also illuminates other informal, less visible groups and how their technological frames influenced technology choices. In this study, technological frames function as an analytical engine for describing the development and deployment (stabilization and closure) of DAU's learning technologies. Within the study at I use terms such as perspective or view that are commonly used within the DOD lexicon as synonyms for technological frames.

Additionally, this study examines tacit knowledge as a component of acquisition expertise and how the DAU's choices in learning technologies affected its transfer. For the purposes of this study tacit knowledge is the knowledge gained through the practice of an activity and that is not easily transferred to another person by means of written or verbal expression (Collins 2010, 8). This research draws on Collins and Evan's model of specialist expertises and categories of tacit knowledge as lenses through which to view the DAU learning technologies in their role of developing expertise. The study describes the roles of "contributory

expertise" – the ability to perform an activity with competence, and "interactional expertise" – the mastery of the language of a specialist domain in the absence of practical competence within the acquisition workforce (Collins and Evans 2007, 14). The study also draws from Collins's description of tacit knowledge types to examine the DAU's learning technologies as transfer mechanisms for the tacit knowledge components of expertise. Collins categorized tacit knowledge by the linguistic or social reasons that cause some knowledge to remain hidden and not shared. These reasons include: Individuals or groups sometimes intentionally withhold or hide information; Individuals or groups do not recognize a piece of information as important, or assume others already possess it; Or that some knowledge is very difficult or logistically cumbersome to transfer (Collins 2010, 93-96). This study examines how the DAU's learning technologies increase or decrease the transfer opportunities for these categories of tacit knowledge.

Finally, the study borrows from Hughes' ideas of technological momentum and artifact durability to further explore the trajectory of DAU's learning technology architecture (Bijker, Hughes and Pinch 1989, 76-77). This research project uses the combination of these aforementioned concepts and frameworks as a toolset to illuminate the evolution of DAU's learning technologies as a socio-technical enterprise.

Methodology

I collected data for this research through document searches and personal interviews. Primary source documents for this study include; three DAU organizational histories, a history of weapons systems acquisition since 1776, two books from a DOD historical series with chapters that discuss the evolution of the DOD acquisition process, four Government Accountability Office (GAO) Reports, a study on incorporating commercial business practices in the DOD

acquisition community, a scholarly work on corporate universities, DAU Strategic Plans from 2001-2013, eight DAU Annual Reports, three DAU technology strategy roadmaps, two DAU curriculum review summaries, two career field competency studies, three separate DOD acquisition community newsletters, multiple versions of three different DOD policies, numerous student survey comments, and a federal statute. While each of these document sources provided valuable information, the DAU technology roadmaps and annual reports yielded particularly useful data about learning technologies and their implementation.

I conducted personal interviews to fill the social, cultural and political voids in the documentary records. I interviewed 24 individuals with deep backgrounds in defense acquisition processes and knowledge of DOD's efforts to build a more expert acquisition workforce. The majority of the study participants had literally decades of experience in developing and managing training programs for the acquisition workforce. The participants provided more than 34 hours of interview content. Most importantly, the participants provided the information and insights necessary to better understand the roles of, and tensions between the stakeholder groups that shaped the learning technologies.

Chapter Organization

This study is organized in seven chapters including this introduction. Each chapter, with the exception of this introductory chapter, will begin with a brief introduction to its main theme and content. Generally, the subsequent chapters flow in chronological order and document the evolution of acquisition expertise development and learning technologies. The first four chapters set the stage for chapters five, six and seven. Chapters one through three provide background and discuss learning technologies that existed prior to the establishment of the DAU. Chapter four tackles the establishment of DAU and its initial learning technology portfolio. Chapters five

and six detail the current configuration of the learning technology architecture. In Chapter seven I provide a glimpse into the evolutionary future of learning technologies in the acquisition community, offer my conclusions, and highlight potential areas of follow-on research.

Chapter Two establishes the existence of specialized expertise within the defense acquisition community. It provides historical background on the nature of the expertise required to develop and acquire weapons systems for the United States. It describes the relationships between government acquisition workers, defense contractors, and the users of the weapons systems. The chapter also discusses the knowledge produced and consumed by these groups during the acquisition process.

Chapter Three describes the frame that links the defense department's goal of successful acquisition outcomes to specialized expertise within the acquisition workforce. The chapter also chronicles early initiatives within DOD to increase the quality and expertise of the acquisition workforce. Particularly it discusses the efforts to develop the expertise of key acquisition managers. Further, the chapter explores the stabilization of DOD's initial acquisition learning technologies and institutions.

Chapter Four explores the destabilizing effects of the Defense Acquisition Workforce Improvement Act on the established and long-standing DOD learning technologies. The chapter concentrates on the changes after the DOD expanded expertise development to the entirety of the acquisition community versus focusing only on key managers. This section also describes the governance structure, stakeholders and closure mechanisms for new teaching and learning technologies.

Chapter Five discusses the evolution of the DAU's current learning technology architecture. The chapter describes how the DAU's shift from an academic model to a corporate

university structure influenced its learning technologies. It also explores the origins of the DAU's model for expertise development – the Performance Learning Model (PLM) and its impact on the learning technology architecture.

Chapter Six examines several learning technologies to illuminate the influences and conflict points of stakeholder groups internal to the DAU. The chapter also explores how the learning technologies hinder or encourage tacit knowledge transfer.

Chapter Seven continues the exploration of DAU learning technologies into the near future to illuminate the impact of ongoing shifts in stakeholder technological frames. Specifically, this chapter will explore the DOD acquisition leadership's shift to focus on expertise development in the workplace. Finally, the chapter will conclude with a summary of major observations and recommendations for areas of further research.

Chapter 2

A Historical Perspective of Defense Acquisition in the United States

Introduction

This chapter provides historical background on the nature of the expertise required to master the complex task of developing weapons systems for the United States. It begins by recounting the actions taken during one of the first major defense technology acquisitions made by the fledgling U.S. government. It then discusses how the relationships between government acquisition workers, defense contractors, and the users of the weapon systems have evolved to their present state. The chapter also discusses the knowledge produced and consumed by these groups during the acquisition process and establishes the importance of developing expertise within the DOD acquisition workforce.

Recognizing the Need for Expertise

Early problems in delivering defense capabilities brought to light the need for specialized knowledge with the War Department. When the "Act to Provide a Naval Armament" authorizing the War Department to build or purchase of six frigates was signed into law on March 27, 1794, the United States began a long history of defense technology development and acquisition programs. This history has been fraught with difficulties. In defense acquisition programs, difficulties manifest themselves in cost overruns, schedule delays, and poor performance in combat.

Political concerns impact technology design and acquisition decisions. In 1794, the strategic mission of the frigates was still being hotly debated within the government. The ships' design was unprecedented and broke with several of the prevailing conventions of naval

architecture. Because of its original design, the appropriated budget of $688,000 was much more of a hopeful guess than an educated estimate. Similarly, the innovative design introduced significant risk into the proposed production schedule. Additionally, Congress desired to spread the economic benefits of the project among the their constituencies. Consequently, Congress directed the War Department to decentralize production activities. This provided yet another test to maintaining control of costs and work schedules. The task to deliver military capability within budgeted cost, and on schedule under these conditions challenged the authority and capacity of the fledgling War Department considerably.

Some in congress saw the mission of the frigates as strictly policing pirates in the Mediterranean. Others within congress and the executive branch saw the frigates as a hedge against European sea power and security for transatlantic and global ocean commerce (Toll 2006, 35-41). These differing views of the ships' purpose fueled a debate over design parameters that resulted in a new, innovative, and ultimately wildly successful (in terms of combat) style of uniquely American warship: the 44-gun frigate (Hughes 1986, 68).

The design debate was eventually settled when Henry Knox, the Secretary of War, chose the 44-gun design of naval architect Joshua Humphreys over several others proposed by equally established and respected shipwrights. Secretary Knox started out his professional career as a book merchant but made name for himself as George Washington's chief of artillery during the Revolutionary War. His leadership and genius in transporting captured British cannons from Fort Ticonderoga to Boston was legendary; however, he was no sailor nor by any means an expert on naval architecture. To deal with this gap in his expertise, Knox sought out the knowledge and expert advice of trusted friends and colleagues with shipbuilding experience. He also held discussions with numerous

other shipwrights, including those who were competing against Humphreys to win the frigate contract (Toll 2006, 46-51).

Perceptions in what counts as expertise and who possesses it helps determine who gets acquisition contracts. Humphreys won the contract because he convinced Knox that he truly understood the missions of the frigates imagined by the Congressional and Naval leadership. He convinced Knox that his oversized, heavily armed, fast frigate design could police pirates and that it held tactical advantages over the two prevailing British warship classes. Humphreys' larger frigate would out-gun the smaller British frigates. The proposed American frigate would have the speed to out run British battleships. However, they would also possess the agility and firepower to attack a British battleship if the tactical situation dictated (Toll 2006, 48).

Design choices are linked to budgets, and therefore politics (Hecht 2008, 60). The risk in choosing an innovative new design extended beyond whether it would perform as envisioned in combat, and into the basic business of ship production. No one had attempted to build ships like these before, so what was it really going to cost? How long would it take? Humphreys and a new Secretary of War, James McHenry found themselves answering these questions before a special congressional committee in 1797. Federalists and Republicans were both incensed by the lengthy schedule delays and cost overruns, and they wanted answers (Toll 2006, 87-88). McHenry's response to the committee highlighted the difficulty in obtaining the live oak timbers required by the designer. McHenry also described the problems of maintaining a skilled labor force in the face of yellow fever outbreaks in two of the shipyards. McHenry further emphasized that the congressional mandate requiring the frigates be built at six different shipyards scattered among the states' voting districts instead of in a single consolidated shipyard was a major contributing factor in the delays and cost overruns (Toll 2006, 88-89).

Defense Acquisition is a Multi-disciplined Endeavor

This effort to acquire new defense capabilities in the nation's infancy highlighted the need for expertise from many different disciplines if defense technology acquisition projects are to be successful. The frigate acquisition project required talented engineers, manufacturing specialists, budget analysts, financial clerks, logisticians, contract writers and negotiators. The project also needed astute business managers with keen leadership skills to mesh and guide the efforts from all the participants. Additionally, the business managers had to be proficient in oral and written communication skills in order to effectively deal with senior leaders from the executive and legislative branches.

Knox and McHenry were among the first defense officials to wrestle with the need to employ talented workers with specialized knowledge and expertise in order to minimize or avoid weapon systems development cost and schedule overruns. Given the general misgivings towards centralized government at the time, Knox implemented a relatively simple but politically risky solution…he made Humphreys and all the shipyard workers government employees. He also assigned the six naval officers designated to command the ships upon their completion to the respective shipyards to help oversee their ships' construction. This brought the operational sailing/combat, engineering, and production expertise all under direct government control (Toll 2006, 55). These groups had to negotiate mutually agreeable solutions to functional, design, and production problems.

Perspectives on with whom acquisition expertise resided changed over time. In ensuing decades the model for putting operationally experienced military officers in charge of acquisition programs remained a common practice. Uniformed military personnel still lead many major acquisition programs in the modern era. However, Congress would later in the 1990s question

and legislate against the practice of privileging military officers over their DOD civilian counterparts for acquisition leadership roles (Edgar 2005, 270).

The Impact of Expertise Re-Location

The location of the knowledge base also shifted over time. The employment status of the workers actually doing the engineering and manufacturing has changed dramatically since the late 1700s. In the case of the first frigates, the skilled workers fabricating the ships were government employees. Whereas now the engineers, technologists, and the skilled labor force needed to develop and produce weapon systems are primarily employed by private industry. Today, DOD must contract with commercial firms in order to gain access to this type of expertise. This fundamental shift can be traced back to the transition into the industrial age warfare.

During the American Civil War the U.S. got its first experience with the demands of industrial era combat operations and logistics. Industrial age warfare is characterized in part by the mass production and expenditure of material on a grand scale. The U. S. government was faced with an enormous demand for weapons and supplies that exceeded its ability to produce with its organic arms manufacturing capacity. The system of War Department owned and operated weapons and munitions armories, arsenals, and depots, could not keep up with demand. The War Department decided to fill the gap by contracting with private industry for greater and greater amounts of goods and services (Jones 1999, 91-127). By the end of the Second World War substantial number of corporations had begun to exclusively focus on defense products vice a mix of commercial and defense business. The rise of these "defense contractors" and the material demands associated with maintaining the large military presence required by the Cold War spawned a symbiotic relationship between the military and

defense industry capable of yielding tremendous political influence (Jones 1999, 154-155). President Eisenhower referred to this relationship as the military-industrial complex in a 1961 speech. He warned against its potential for exerting a level of political influence capable of bankrupting the nation by warping spending and technology research priorities (Jones 1999, 326-327).

President Eisenhower's warning has proven to be justified with the military and defense contractors exerting significant influence on congressional appropriations. Indeed, congress is now a fully engaged and intertwined in the power-laden process of providing weapons to the military while promoting the economic development within their constituencies. What gets built, where it gets built, who builds it, who maintains it, and where it is maintained are questions not answered solely on the factors of lowest cost or highest military utility. Defense technology solutions are always influenced by various competing political objectives from both the legislative and congressional branches. Acquisition tasks and decision-making are made much more complex by having to navigate through the swift and constantly changing political currents.

The emergence of military-industrial complex and its associated political clout did not reduce the cost and schedule overruns in acquisition programs. Indeed, such problems still exist today; only the dollar amounts continue to increase. In their day Joshua Humphrey's frigates were the most complex military technology ever acquired by the United States and suffered through cost and schedule target breaches. Today, the F-35 Joint Strike Fighter is arguably the most sophisticated weapon in development. The Government Accountability Office reported in 2012 that it was at least five years behind schedule and that it would overrun its original budget by more than 15 billion dollars. It provides a current an example the economic impact resulting

from gaps in acquisition knowledge and expertise in the high-stakes business environment of DOD technology acquisition programs.

Exercising sound technical judgment and making good business decisions in the complex socio-political-economic web of defense acquisition is made more difficult by the locus of available expertise (Hughes 1986, 281-292). Knowledge and expertise are the foundations for good judgment. The shift in the predominance of technical and management expertise from the government to industry has placed the DoD into an agent-principal relationship with all of the difficulties caused by the asymmetry/inequality of information inherit in such a relationship. That is to say that in a principal-agent relationship the principal possesses much greater knowledge about the technology to be acquired and the required development tasks than does the agent.

There are risks inherit in the principal-agent relationship. Two notable ones are adverse selection and moral hazard. Adverse selection is the situation where the military (principal) does not have enough information to reliably judge which defense contractor (agent) is best suited to develop a particular military capability. Morale hazard refers to the potential for an agent to commit fraud or other misbehavior because the military (principal) lacks sufficient knowledge about the defense contractor's (agent) performance (Guston 2000, 32-36).

The government developed rules guarding against adverse selection and moral hazard that added to the areas of expertise required of the acquisition workforce. As examples, the Federal Acquisition Regulation (FAR) subpart 15.3 protects against adverse selection by prescribing rigorous procedures evaluating and selecting vendors for contract award. Subpart 3.10 describes a code of ethics demanded of companies conducting business with the federal government as a hedge against moral hazard.

Consequently, defense acquisition workers have yet another knowledge area they must master beyond their technical and managerial savvy…they must be experts in regulation and policy compliance. This is no easy feat considering the volume and volatility of the policy documents. The inaugural weapon systems acquisition policy issued by the DOD in 1971 was only seven pages long. The DOD gave the policy the numerical designator of 5000.1. In contrast to its concise beginnings, DOD acquisition policy and guidance has evolved and expanded with almost every change in Presidential Administration (Ferrara 1996, 125-127). The current version of the directive is 10 pages in length, but the accompanying implementing instruction is 232 pages. These two documents are regulatory. DOD has also published an acquisition guidebook, which does not have the force of regulation, but rather describes preferred practices and processes. The Defense Acquisition Guidebook (DAG) unlike the regulatory documents, which undergo major revision approximately every four years, is under constant revision. The DAG currently contains over 800 pages of guidance. The expectation is that acquisition workforce members will be familiar with this substantial body of knowledge and be able to put it into practice in their respective acquisition programs.

The asymmetric level of knowledge inherent in the DOD (principal) - Defense Contractor (agent) cuts both ways and impacts the skill set needed by acquisition workers. During the acquisition process the military in most cases understands what it generally needs and must communicate those needs in both technical and contractual terms to the defense contractors. Defense contractors must seek a dialogue with the military to gain a better understanding than their competitors of what the military needs to both win the contract and then to deliver the required military capability within the contract terms. We may view the entire contract award process used in the federal government an anti-adverse selection mechanism. The contract

award process is designed to select the defense contractor that has the best understanding of what the military needs and has the capacity and expertise to deliver within cost and schedule.

Notably, a similar principal-agent relationship exists between the actual military users, referred to as the "warfighters" and the acquisition community. The warfighters are the one with actual capability needs, but they do not have the expertise or the time to interface with the defense industry. The warfighters use the acquisition community as their agents in procuring new defense technologies.

The Socio-Technical Nature of Acquisition Expertise

Acquisition workers practice their skills in crafting defense technologies within in a complex socio-political environment. The relationships between industry, the warfighting community and the acquisition community illustrate the breadth of expertise and knowledge required of workforce members. They must have an understanding of military operations and warfighting language in order to effectively translate needs and negotiate with industry on behalf other the warfighters. This is an iterative, demanding, and almost constant process that creates an ever growing and evolving body of

knowledge that shapes and defines the technology being acquired (Van Nostrand 1997, xiii-xv). Additionally, acquisition workers become the initial arbitrators when the needs and desires of the warfighters exceed the capacity of the defense contractors to deliver within cost and schedule constraints. The acquisition workers must be able to formulate and negotiate trade-offs between cost, schedule and performance with the warfighters and the defense contractors being ever mindful of how even greater political factors weigh on their technical decisions, blending their designs into "seamless blend of political and technological goals and practices" (Hecht 2008, 88).

Acquisition workforce members have challenging jobs and their performance hinges on specialized expertise. They must be subject matter experts in their particular discipline whether it is cost estimation, systems engineering, logistics, contracting, program management or any other of the 13 acquisition career fields. They must master an immense and every changing body of regulatory practices proscribed at the federal, DOD, military service, and defense agency levels. They must possess a substantial level of business acumen to negotiate and manage their relationships with defense contractors. They must also have a basic knowledge of military operations. More importantly they must be able to assist the warfighter in defining and articulating their desired combat capabilities and operational outcomes. Acquisition workers need this knowledge and skill so that they can properly represent the warfighting community to industry. In essence, the work of acquisition professionals is to facilitate closure between all the stakeholders; the acquisition community, warfighters, defense contractors, congress, and the executive branch, on the research, development and procurement of defense technology (Bijker, Hughes and Pinch, 1989).

The changing roles of the acquisition professional from being the principal to being the agent in their relationships with the warfighters, defense contractors and elected government officials makes their task of reaching closure more difficult. The facilitation of successful solutions requires the ability to get behind the curtains erected by defense contractors to maintain their advantage of asymmetrical information in order to ascertain a true and accurate picture of the developing technology. Conversely, defense acquisition professionals must also be careful about what they put on the front stage in order to protect DOD interests (Hilgartner 2000, 18).

Developing expertise in the workforce matters. Given the impact that poorly executed defense acquisition programs can have on both the military and economic security of the U.S.,

preparing defense acquisition workers to competently fulfill these duties is an important task. Indeed, the quest to improve the expertise of the acquisition workforce has garnered considerable attention from the DOD leadership and congress over the past five decades. By the early 1960s efforts to provide specialized training to the acquisition workforce emerged (Acker 1986, xiv). These early efforts by the DOD leadership laid the foundation for the substantial body of training curriculum and learning technologies that exist in the defense acquisition community today.

Chapter 3

A Socio-Technical Expertise Development Enterprise Takes Shape

Introduction

This Chapter discusses the overarching frame or perspective held by leaders in the DOD acquisition community that linked expertise to acquisition success. It also explores the influence of this frame on early acquisition training organizations, their learning technologies and their potential for disseminating tacit knowledge. The chapter also provides historical background to deepen understanding of future evolutionary changes in acquisition training organizations and technologies.

Initial Efforts Focused on Program Management Expertise

The early path to developing acquisition expertise was linked characterized to a desire to consolidate the specialized training into a joint service structure (Acker 1986). This move was guided by a prevailing belief among DOD leadership that better, more uniform training would lead to better acquisition outcomes. The DOD adopted a traditional classroom education/training paradigm relatively quickly. Early framers of DOD acquisition training embraced approaches that could develop and disseminate tacit and explicit knowledge. However, they did so without any stated intent to apply a particular tacit-explicit knowledge theoretical framework as a guide. The joint, graduate-level classroom course structure first implemented by the DOD leadership remained stable for almost 30 years (Acker 1986). The resultant training institution and its curricula became the principle source of knowledge, values and culture for the emerging profession of defense acquisition.

The DOD focused in the beginning on expertise development for top acquisition managers. 1961, Robert McNamara, an exceptionally accomplished businessman, became the Secretary of Defense and brought to the DOD a series of business efficiency initiatives. He gave personal attention to the problems of cost overruns and schedule slippages among major weapon systems acquisition programs. He attended conferences on weapon systems management to instill his business philosophy and outline practices aimed at making DOD acquisition programs more efficient. At a 1963 program management conference held in New London, Connecticut he conveyed his belief that quality of personnel assigned to manage weapon acquisition programs should be commensurate with the importance of the weapon to national security. McNamara stated that acquisition program leadership positions "demand the best managerial talents" (Acker 1986, 4).

A Linear Model of Acquisition Expertise

McNamara's desire to have expert, talented managers available in acquisition leadership positions assumes a relationship between expertise and acquisition outcomes. It is a perspective that has been embraced by most, if not all, of his successors. The underlying conviction in this position is that there is a causal relationship between the talent and quality of acquisition leaders and successful weapon systems development. Certainly, this is a commonly held belief in the commercial world. After all, many successful businesses pay top dollar for proven managerial talent. But DOD acquisition is a public sector venture, not a commercial one. Investing public funds to acquire or develop acquisition talent in order for the nation to be more militarily and economically secure is very similar to the linear model of science embraced by Vannevar Bush (Stokes 1997, 10). Briefly stated, the linear model of science promotes public investment in

basic scientific research as a necessary condition for future technological advances that benefit society as a whole.

Figure 1 Simplified Linear Model of Science

Basic Research → Applied Research → Social Benefit

The belief in a causal relationship between the expertise of acquisition personnel and the delivery of useful military capability to warfighters within cost and schedule constraints was, and continues to be a strongly held belief within the DOD leadership.

The "linear model of acquisition success" as an analog to the linear model of science articulates the prevalent belief that investment in high quality acquisition workforce members leads to better decision-making within the acquisition programs which then leads to successful acquisition outcomes.

Figure 2 Linear Model of Acquisition Success

Quality Acquisition Workforce → Better Decisions → Improved Defense Technology Acquisitions

As early as the 1950's the DOD attempted to train expertise into its select groups of employees involved in acquisition work (Layton 2007, 5-6). Despite its history of success in using training to improve the quality of its fighting forces, DOD's initial attempts at specialized acquisition training to improve the quality of the acquisition workforce got off to somewhat uneven start. In 1952, the DOD had issued directives to the individual Military Services that mandated specialized training for military and civilian contracting officers. However, the early

training mandate for the contracting officials met with mixed reviews (Layton 2007, 10). The limited success can be attributed, at least in part, to the Services viewing training for a largely civilian cadre of contracting officers as a lower priority than other activities more directly tied to combat operations. Additionally, each Service employed multiple training organizations that used unique, uncoordinated curricula to execute the mandatory contracting training. These two factors resulted in multiple standards for training and uneven attendance. In 1984 the DOD Inspector General reported that only 33% of senior contracting officials had completed their mandatory training (Layton 2007, 12). Despite the limited success of these early initiatives the DOD leadership continued to believe in the value of specialized acquisition training and pressed forward with additional training programs albeit with a greater emphasis on joint training.

Unifying Acquisition Expertise Development Technologies

The DOD leadership began the process of unifying and consolidating expertise development by first focusing on improving the quality of training available to program managers. Program Management was emerging as a discipline within industry and the DOD for managing complex technical projects, but no formal DOD training program had yet been established. Secretary of Defense McNamara directed the establishment of the first enterprise level acquisition schoolhouse in 1963 (Acker 1986, 4). This new enterprise level organization was designed to teach program management techniques to military officers and DOD civilians working as defense acquisition program managers. It should be noted here that at this time the DOD had not yet categorized any individuals or groups as “acquisition workers”. The Services and Agencies selected employees to send to the training based on their actual or potential assignment as program managers. McNamara had recognized that the huge disparity in experience and expertise between DOD acquisition officials (often military officers coming from

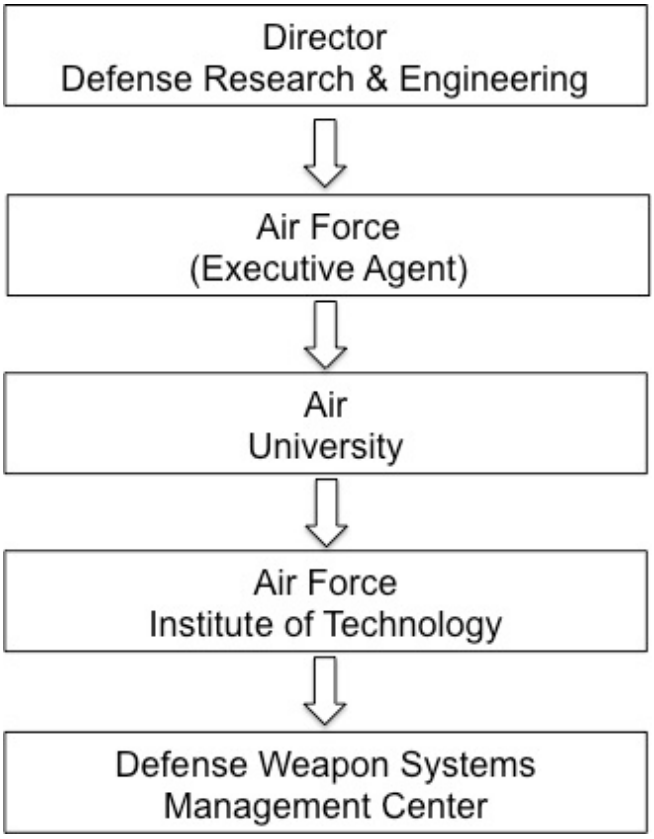
operational units) and their industry counterparts was a contributing factor in many struggling acquisition program (Poole 2013, 79-80). A series of studies involving 22 different weapons programs in the mid-1960s indicated cost overruns of up to 150% and schedule slips of up to 40%. The C5A Galaxy heavy transport aircraft, Cheyenne helicopter and DD 963 navy destroyer are some of the programs that experienced significant cost and schedule overruns (Morris 1997, 27-29). In 1965, while serving as a Deputy Assistant Secretary of the Air Force, Ron Fox, inspected seven different Air Force weapons program offices. There he found the program managers rarely served in their positions more than a year. Fox's field notes indicate that the lack of experience and expertise amongst the Air Force project officers resulted in the defense contractors "humoring the Air Force personnel …so that they would keep out of the contractor's way and allow him to move ahead with business as usual" (Poole 2013, 81).

The new joint, enterprise-level program management training initiative was designed to close the knowledge/expertise gap in the principal-agent relationships between the military acquirers and the industry providers. Additionally, it was intentionally built as a Joint Service organization to avoid some of the problems DOD experienced with the independently conducted contracting training. The DOD designated this inaugural joint acquisition education and training organization as the Defense Weapon Systems Management Center (DWSMC) (Acker 1986, 5-6).

The DOD initial choice assigning organizational responsibility had a significant impact on the technology of expertise development. The Management Center was located at Wright-Patterson Air Force Base in Dayton, Ohio. The DOD assigned the Air Force as the executive agent (Acker 1986, 7). This meant that the Air Force had the responsibility for providing the required administrative and logistical support for the Management Center. Organizationally, the

Air Force situated the Management Center within the Air University structure under the Air Force's Graduate School, the Air Force Institute of Technology (AFIT) (Acker 1986, 8). A simplified organization chart is provided in figure 3. This gave the Management Center a graduate school pedigree although without degree granting authority. This move infused expertise development with an academic identity that would persist for almost 40 years.

Figure 3 Initial DWSMC Organization Chart



The initial expertise development technologies had classroom teaching and research components. The DOD assigned the Management Center a four-part mission: First, it was charged with providing an educational program for DOD and other federal agency personnel with responsibilities for major weapon system program management. Second, the Management

Center was to conduct research in weapons systems management concepts to support curriculum development and maintenance. Third, it was directed to identify, evaluate, and disseminate information on weapon system acquisition practices. Lastly, the Management Center was to provide resident and non-resident courses of study as required and requested by the Services. These Service requested training products were referred to as "short courses" (Acker 1986, 7-8).

A Structure for Expertise Development Emerges

The primary product or learning technology of the Management Center was influenced by its Air Force Institute of Technology affiliation. The principal technology was the 10-week long Program Management Course (PMC). The relatively low volume of students, graduate-school culture was gleaned from its parent organization. The Program Management Course was offered only 4 times a year. The first class of 18 students graduated in September of 1964. Between 1964 and 1970 the Management Center graduated a total of 1218 students (Acker 1986). The core missions, and academic culture of the Management Center would be passed-on to its immediate successors. However, the DOD's perspective on what the goals for the students should be evolved over time.

The original goal of the Center was to produce decision-makers, not expertise in any particular acquisition associated discipline. Deputy Assistant Secretary of Defense James Davis had been given the lead role in overseeing the establishment of the Management Center and was clear in his goal for the school's graduates. Davis did not believe that graduates of the course should be viewed as experts or "professional practitioners", rather he expected the Management Center to arm the graduates with a depth of knowledge which would allow them converse intelligently with professional specialists employed by DOD and defense contractors. Students

would graduate the Project Managers Course with the ability to ask the right questions in order to gather the information needed to make good programmatic decisions (Acker 1986, 8).

Davis's stated goals for the Center are most comparable to gaining what Harry Collins and Robert Evans describe as "interactional expertise" (Collins and Evans 2007). Interactional expertise is one of the expertise categories identified by Collins and Evans in their tacit knowledge and expertise framework, which they dubbed the "periodic table of expertises". Within the framework are categories of increasingly more insightful and focused tacit knowledge. Collins and Evans describe two main categories of knowledge: Ubiquitous Tacit Knowledge and Specialist Tacit Knowledge. Ubiquitous Tacit Knowledge includes all the myriad of general skills required to live and operate within society. Specialist Tacit Knowledge then refers to the skills required to function within a specific discipline, profession or vocation. Collins and Evans further subcategorize Special Tacit Knowledge into interactional and contributory expertise (Collins and Evans 2007, 14).

Interactional expertise, according to Collins and Evans, is expertise in the language of a specific discipline, profession, vocation or other specialization, but without the expertise in their associated tasks and practices. It is developed through participatory observation and intensive socialization within a community of specialist practitioners. According to Collins and Evans, Management Center graduates in possession of interactional expertise would be able to converse with both government and industry acquisition experts at a level where it would be difficult or impossible for the specialists to discern whether or not the graduates had ever actually performed a particular acquisition task or worked in the specific acquisition career field being discussed. If the training provided by the Management Center met Davis' expectations, graduates would be on more equal footing with the defense contractors. The government project managers would be

able to speak the language, ask probing questions and be better able to judge the quality of the responses. To borrow from the earlier example, the graduates would be more likely to be dealt with as peers and less likely to be subjected to "humoring" by their industry counterparts.

To achieve this level of interactional expertise, students would have experience significant social immersion involving close interaction with DOD and industry subject matter experts supplemented by their specialized Management Center training. Notably, the real value of interactional expertise lies not in the potential of its possessor to pose as a professional specialist practitioner but rather that it gives them the knowledge and expertise necessary to ask appropriate questions, and to understand the answers so that they are more able to discriminate between what are sound and unsound courses of action, and execute proper judgment. "…by being immersed in the language community alone one may learn to "know what one is talking about" even if one cannot do the corresponding activity." (Collins and Evans 2007, 59) "…someone who possesses it [interactional expertise] in full ought to be as good a judge of the contributory expertise to which it pertains as someone who has the contributory expertise itself." (Collins and Evans 2007, 60)

In contrast to interactional expertise, Collins and Evans categorize the "ability perform a skilled practice" as contributory expertise. Contributory expertise is developed through "doing" – practicing and performing tasks within a professional domain. Contributory expertise would more closely aligned with Secretary Davis' idea of "professional practitioner" (Acker 1986, 10). Importantly, there is a transitive relationship between contributory expertise and interactional expertise. That is, if one possesses contributory expertise in a domain, they also possess at least latent interactional expertise within that domain. In order to realize their interactional expertise,

contributory specialists must also possess “interactive ability” – the capacity to interrelate and convey knowledge to others (Collins and Evans 2007, 38-39).

The Role of Prestige in Expertise Development

The technology of expertise development changed and evolved with leadership’s emphasis on increasing the prestige of the work. Continued problems in acquisition programs triggered decisions by DOD leadership to modify the organization, mission and goals of the Management Center. In 1971, the General Accounting Office (GAO) conducted a survey of 38 major weapons programs and found that the cost estimates of the programs had, on average, increased by 50 percent over the initial contract cost figures (Jones 1999, 371). David Packard, the Deputy Secretary of Defense, working slightly ahead of the GAO auditors, had commissioned a review of the Management Center in 1969 to evaluate the adequacy of the curriculum to prepare students to manage major weapons programs. Packard, like McNamara, was an accomplished businessman and also shared McNamara’s firm belief that acquisition workforce members should receive the finest professional education in weapon systems management possible (Hirsch 2001, 30). Packard’s stated belief the acquisition success relied upon having a competent workforce illustrate the preeminence of the “linear model of acquisition success” within the DOD.

Power and prestige played a role in reshaping the expertise development enterprise. A study group, organized by the Director of Defense Research and Engineering (DDR&E) found that the Management Center had not achieved the expected level of national prestige (Acker 1986, 17). Consequently the Study Group’s recommended actions appear to have focused on providing avenues to increase the prestige and relevancy of the Management Center. The study group opined that the lower than desired level of national recognition was due, at least in part, to

the earlier collective DOD/Air Force decision to situate the Management Center deep in the Air Force organizational chart. Therefore it recommended that the Management Center be raised-up to be an Office of the Secretary of Defense (OSD) level entity.

The Defense Research and Engineering organization sought more control over expertise development. Specifically, the study group recommended placing the Management Center under the direct control of the Director of Research & Engineering (Acker 1986, 17). That the study group recommended Management Center report to the Director of Research & Engineering was not particularly surprising move since the chairman of the study group was the Deputy Director of Research & Engineering. The attempt by the Director of Research & Engineering to situate the relocated Management Center under his direct control indicates an awareness that the attention given the new Management Center by Packard would expand his own organization's prestige and standing in the DOD bureaucracy. Additionally, the Study Group suggested that the Management Center relocate to the Washington, D.C. area – the geographic center of power and prestige for DOD (Acker 1986, 17).

Other recommendations were made that would elevate the perceived worth and prestige of the fledging expertise development enterprise. The study group recommended that the DOD institute technologies that expanded knowledge dissemination to activities outside the classroom thus expanding its reach within the acquisition community. The study group made several other suggestions in addition to the recommendations on organizational realignment and physical location. The study group clarified the Management Center's mission to identify, evaluate, and disseminate information on weapon system acquisition practices. It required the Management Center to publish the weapon system management lessons and proven practices developed at the center for members of the DOD acquisition and defense contractor communities. This

requirement would potentially increase the relevancy and prestige of the Management Center's products as well as expand its reach outside of the DOD community. Also, the study group recommended that DOD establish a Management Center Board of Visitors (BOV) with membership drawn from senior members of the defense industry, general business and academic communities to act as external advisory body (Acker 1986, 25).

The Study Group, by including a BOV in its recommendations, supported its goal of increasing prestige in at least two ways. First, enrolling senior government, business and academic leaders in Management Center's strategic planning function built the perception of importance within those communities. Second, the BOV's endorsement of the Management Center's research program as well as its curricula provided a stamp of credibility from a respected group of experts.

The DOD leaderships desire to increase the prestige of acquisition work and those who performed it influenced next evolution of expertise development technology.

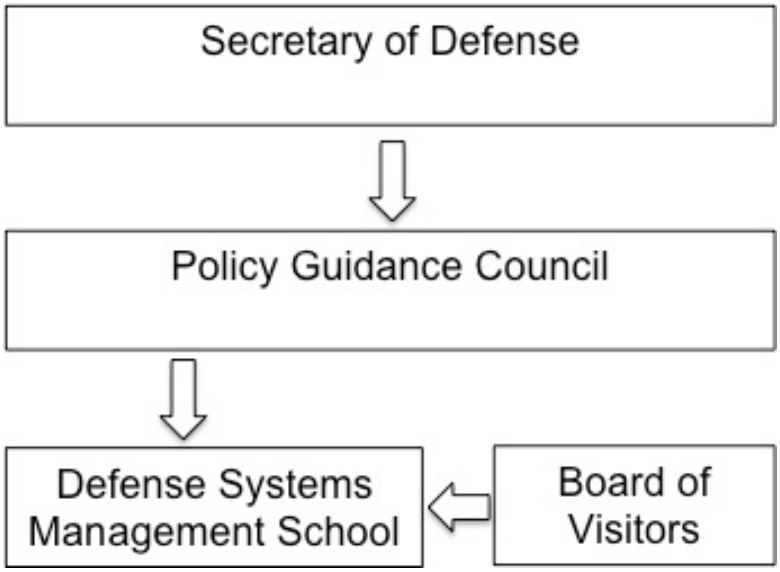
The study group recommended that the 10-week Project Management Course be replaced by a 20-week graduate level course. This proposal was in line with the desire to elevate the status of the Management Center. By recommending that the course be executed at a "graduate level", the Study Group immediately signaled that the new approach would eclipse mere training. In the DOD, the amount of time and money spent in an effort is often viewed as a primary indicator of importance within the bureaucracy. Therefore when the study group lengthened the course to accommodate its new focus of providing a more immersive, participatory environment it killed two birds with one stone (Acker 1986, 21). It provided the course duration required by a new pedagogical approach and signaled that the endeavor was worthy of a significant increase in time and travel costs.

New stakeholder groups emerged as part of the technology evolution. Secretary Packard implemented all of the aforementioned recommendations, save one. He chose not to transition the Management Center directly into the Research & Engineering organization. Rather he established a Policy Guidance Council (PGC), chaired by the Director of Research & Engineering, with representation from all of the stakeholders – the Office of the Secretary of Defense, each of the Armed Services and the separate Defense Agencies. Packard placed the Management Center under the control of the Policy Guidance Council. The Policy Guidance Council provided a new governance structure and functioned as a formal organizational forum where all the relevant stakeholders could hammer out differing views on the center's policies, trajectory, and resourcing (Acker 1986, 25). This new management approach helped level the playing field among all the concerned parties by making the routine operations of the Management Center more visible outside of the Air Force than when the Center was subordinate to the Air Force Institute of Technology. A simplified DSMS organization chart is shown in Figure 4.

The DOD leadership took actions to elevate the perceived status of expertise development efforts. Packard ordered a name change for the Management Center concurrent with its move to Fort Belvoir, located well within the Washington, D.C. sphere of influence. On June 30, 1971 the DOD disestablished the Management Center and reestablished it as the Defense Systems Management School (DSMS). Deputy Secretary of Defense David Packard himself spoke at the Systems Management School opening ceremonies and in his comments indicated his intention that the Systems Management School would be an academy of "high distinction" where the best modern management practices would be taught (Layton 2007, 7). For Packard, "best modern management practices" meant the latest developments in program

management theory, practices and procedures. Packard had already approved the vehicle for teaching such modern management practice – the expanded, 20-week Program Management Course as recommended by the Management Center Study Group (Layton 2007, 8).

Figure 4 Initial DSMS Organization Chart



20 Weeks to Expertise

The new acquisition expertise development governance structure fashioned a technology that met their goals for increased status and high academic standards. The concept for the "long course", as the 20-week version of the Program Management Course later came to be known, was the brainchild of the Management Center curriculum committee. The Curriculum Committee had operated concurrently with the Study Group and was chaired by a highly regarded Assistant Secretary of the Army, Dr. J. Ronald Fox. Dr. Fox had considerable experience in managing large engineering and construction projects through his work on the Navy's Polaris missile program and had gained a reputation as an expert in DOD acquisition. He guided the curriculum design to focus on developing more hands-on, experiential type expertise.

Fox wanted the students to learn by doing in a simulated acquisition environment (Acker 1986, 20).

Fox's philosophical approach was more closely aligned with the development of contributory expertise and it significantly influenced the content of the training course. He had quite different expectations than the "be able to ask the right questions" goal set forth earlier by Deputy Assistant Secretary James Davis. Fox and the curriculum committee intended for students of the 20-week course to be faced with "real world" problems and to focus not on "what to do" but "how to do it" (Acker 1986, 21).

Management Simulation Becomes Focal Point of Expertise Development

As the course evolved, the focal point for teaching modern management practices in a "real world" environment became "System X". System X was lengthy case study based on a hypothetical surface-to-surface missile system. It consumed more than 25% of the total instructor contact hours. In the System X management simulation, Systems Management School students, in small groups, worked through a series of 29 separate, but linked, practical exercises that spanned the imaginary system's lifecycle. System X was part of the "management laboratory" and was intended to teach critical thinking and give students practical application in "how to manage". There were no "school solutions" to any of the practical exercises. The students crafted their solutions within their small groups, presented their solutions to the entirety of the class and defended their solution against those of the other small groups (Acker 1986, 21-23). The System X management simulation also required the students the operating in teams while solving problems. The perceived benefit to this team approach was that it allowed students to build real life experience and valuable tacit knowledge in leadership and managing group dynamics. It did not necessarily work entirely as planned. "The idea itself was excellent.

But it had some major flaws…there were too many students overlapping and looking at the same things…there were too many student who could stand around and let others carry the weight" (Study Participant 019).

Over the next few years the Systems Management School staff and faculty continued to refine their courses, teaching techniques and support functions. The Systems Management School leadership and faculty performed their duties well enough to avoid any major intervention by the major stakeholders.

It is during this time frame that expertise becomes a means to draw a boundary for the acquisition community. The execution of the Program Management Course had been adept enough that the DOD leadership decided to require that program managers of major weapon systems attend the course (Layton 2007, 10). By adopting a policy of mandatory attendance, the DOD leadership addressed a couple of issues. First, the action was intended to improve performance within the program offices. Second, the leadership wanted to address the lagging prestige issue, so they intended the action to boost the status of acquisition program management positions to the same level as command positions in operational units. Newly selected commanders of operational units were already required to participate in specialized, and respected command preparation courses. This directive drew a line in the sand and said you cannot belong without this expertise. It may also have helped boost the standing of the Systems Management School organization as a whole.

Increased prestige surrounding the technology of developing expertise helped provide identity and boundaries for the acquisition community. By 1976 the reputation of the Systems Management School had increased to the point that the DOD leadership believed that it deserved to be recognized as a college. That year, after a visit to schoolhouse, the Deputy Secretary of

Defense directed that the institution be re-designated as the Defense Systems Management College (DSMC) in acknowledgement of its excellent curriculum and high caliber graduates (Layton 2007, 8). It is a moniker that survives today.

The Program Management Course remained remarkably stable from 1971 until 1995. Certainly, there were modifications and improvements to the Program Management Course, and to the number and type of functional area or "short-courses" offered, but no changes to the top-level structure and intent of the Program Management Course. For example, the System X portion of the acquisition management laboratory remained a significant component of Program Management Course despite a reduction in the associated student/instructor contact hours from 118 hours in 1971 to 103 hours by 1985 (Acker 1986, 59, 379).

Even during this period of stabilization, some controversy existed. There is no documented evidence of frame clashes between the major DOD stakeholders (the Services, Defense Agencies, and staff elements of Secretary of Defense's office). However, Congress found fault with DOD enforcement of its internal training requirement. Services and Defense Agencies were not consistent in sending their program managers to the Systems Management School. A 1990 House Committee Report noted the only 48 percent of Air Force and 29 percent of Navy Program Managers had attended the Systems Management School as required by the Defense Procurement Improvement Act of 1986 (Layton 2007, 11). This put the Services at odds with Congress, which viewed the DSMC experience as valuable and desirable.

The Service's lack of diligence in sending program managers to the Systems Management School is most probably the result of competing priorities rather than simple apathy. Representatives from the Services had participated in the Management Center Study Group and would have worked to educate their organizations on the need for the training and to

tout the prestige of completing the course of study. While DOD organizations generally place a high value on training, they place even more value on mission accomplishment. DOD leaders will delay or cancel training in times of increased operational tempo or low staffing in order to meet mission requirements. Furthermore, most of the program managers during this time period were military officers who had career paths that regularly conflicted with training opportunities. Military officers needed to move into ever more responsible positions at a relatively rapid rate in order to stay competitive for promotion. The nearly five-month long Program Management Course sometimes presented a scheduling problem for officers being groomed through their assignments. The acquisition training was seen by the Services as a priority, but not something to be enforced with such rigor as to damage the careers of individual. Congress would eventually provide statutory direction to DOD for mitigating this career path problem (Edgar 2005).

Technological Momentum and Identity

Hughes concept of technological momentum that describes the phenomenon of technologies becoming obdurate and influencing future technology choices is a useful lens through which to view DOD expertise building technologies (Hughes 1989). The DOD's model for developing expertise gained significant technological momentum and helped create a since of identity. The paradigm of a traditional brick and mortar institution offering somewhat lengthy graduate level specialized training to a relatively small, select group of students remained unchallenged for nearly 30 years. The supporting investments made by the DOD in facilities and faculty helped to reify the approach. That stability allowed the Program Management Course to assume the force of ritual for both the students and faculty and further reify its structure. Aspiring leaders of the acquisition workforce pilgrimaged to Fort Belvoir for the "long-course" as part of their rites of passage into upper echelon leadership positions. The acquisition

community had sought salvation from wayward acquisition programs by way of professionalizing its managers and the Program Management Course was the Alter from which the community drew its professional values and culture.

The expertise building technology doubled as an identity builder. From the early 1970's to the late 1990's, to graduate from the Program Management Course was to become a Defense Acquisition Professional. The Program Management Course was vital to the acquisition community as a whole and the import of the course also deeply felt by the individual students. It helped build a sense of identity for the community. Whereas the students identified with their Service or profession, i.e. engineer, they also developed a sense of belonging to growing community of trained acquisition managers. The influence of Program Management Course sense of identity was evident in the way they reacted to the question of whether or not they attended the course. Almost to a person, the study participants would immediately provide the course number that they attended. Each Program Management Course was assigned a unique course number identifier that indicated the year and which of the 2 or 3 annual offering slots it occupied. Participants who had attended more than 30 years ago could recite their course number, and would do so with pride. Additionally many of the study participants still had their Program Management Course class photographs displayed in their offices alongside their college diplomas, professional society membership certificates, and military awards.

The sense of identity was also evident in how they described their participation in the course. All but one of the research participants that I interviewed who were also graduates of the Program Management Course praised the course and expressed gratitude for the experience. The Program Management Course graduates used words and phrases like "great course", "I loved it", and "world class course". Study Participant 005, with many years of experience in his

acquisition career field, referred to his time at Program Management Course this way: "As a learning experience, and as a career broadening experience, it was one of the most outstanding things I've ever done in my 40 years of working for the government – it was a great opportunity."

The Program Management Course, as an expertise development technology, developed a reputation so strong that it spilled over from the government sector into the private sector. Study Participant 008 commented on the "major prestige" associated with attendance. He remarked that to be selected meant that one was "up and coming" in your career and that when he was selected for the course while still an active duty military officer he felt like "he had arrived" at his career path destination. He also noted that in the 1980s and 1990s many acquisition workforce members believed that having "Program Management Course Graduate" on one's resume was a $5000/year salary bargaining chip when applying for jobs in with defense contractors. His assertion is entirely plausible given that the executive development programs for several major commercial firms. For example, Lockheed Martin's executive training program included attendance at Program Management Course as one of three acceptable options. The other two options were training programs offered at the Harvard and MIT schools of business (Johnson 1995, 44-46).

The Program Management Course, as the primary expertise development technology also helped build a sense of community and shared culture. In that way, the experience provided value to students beyond the quality professional training. Along with the academics, the course offered an exceptional opportunity to extend professional networks and to establish friendships that would serve classmates well as they advanced in their individual careers. The course barbeques and intramural sports clashes were bonding experiences that developed a lasting since

of community despite the differences between the military services and between the uniformed and civilian students. Notably, deep bonds also developed between the faculty and students. Faculty came to be seen as dedicated mentors. “We intentionally pushed [with the students] the social engagements outside of class…really got to know you [the faculty], not just sit in class” (Study Participant 019 2014). Study Participant 001 described it this way: “When I came through here as a student I felt like everyone walking around here at this campus was about making me a better student so that when I went back to the workforce I was better prepared.” Even the one study participant who had remarked that the course was largely “pabulum” recalled his course number and named a number of classmates who went on to very successful careers in defense acquisition.

As impactful as the technology was on the students, it also shaped the culture of the faculty. The culture took on a strong academic flavor. The organization had a Provost, Deans, and Department Chairs. The faculty carried the title of “professor”. The schedule and flow of the course created a rhythm that encouraged faculty to develop close collegial bonds in a multi-disciplined environment, allowed significant time for individual research, and assisted in the development of close personal ties to the students. Similar to the way the flooding of Nile influenced Egyptian activities and culture, the schedule of the Program Management Course provided a predictive flow for times to teach, update curriculum, and to conduct research. The Program Management Course was only offered twice per year. Except for the fluctuations in holiday weeks, the courses were offered during the same timeframes each year. The low number of annual offerings meant that instructors taught a very manageable 300-350 hours per year.

The Program Management Course facilitated an integrated, multi-functional approach to teaching and learning. Faculty with specializations in business, engineering, logistics,

contracting, policy, and financial management were teamed together and lead by a senior program management instructor (Study Participant 002). While the instruction was stove-piped in the sense that the function experts taught their particular trade, the instructors were compelled by this teaming arrangement to discuss the interfaces between the disciplines and to disseminate changes within their functional area to the other instructors to keep all the instruction consistent. The management laboratory, where the System X simulation resided, was designed as the tool to fully integrate all the acquisition functions. This arrangement not only helped integrate the curriculum, it wove tight professional and personal relationships across the learning enterprise. "I got to know and work with some great folks from the other departments…but that all went away" (Study Participant 017 2104).

Research was part of the expertise development technology. The predictable teaching cycle coupled with the manageable workload afforded faculty time for individual research and organized professional development. Faculty members used part of their time to conduct research in order to keep the curriculum current. The nominal ratio of time teaching versus preparing for class, to include research for topic currency was reportedly four to one. That is faculty prepared four hours for every hour actually teaching. In addition to research to support curriculum and maintain currency, faculty members also executed independent and directed research on acquisition policy and processes. Faculty members were allowed to rotate from a functional department like Business or Policy into the research department for six months to a year. A number of the faculty used this type of rotational assignment to complete doctoral research projects. "We [the DAU] used to let faculty take 6 months or a year off to work on their research" Study Participant 012. By all accounts, the work at the Defense Systems Management

College was considered prestigious and professionally and personally rewarding. "They had this attitude of 'Harvard on the Potomac'" (Study Participant 022 2014).

The momentum afforded by the long-term stability of the Management College and Program Managers Course would lay the foundation for considerable difficulty in attaining closure as new learning technologies emerged in the late 1990s and early 2000s. The shift towards a new training model and technologies would actually begin in 1990. At that time, leaders in both the DOD and Congress reframed the idea of expertise and professionalism to include all acquisition functions, not just program management, leading to the passage of groundbreaking legislation.

Chapter 4

A New Approach to Expertise Building – The Defense Acquisition University

Introduction

This chapter explores how the interactions of stakeholder groups (relevant social groups) shaped the DOD's approach to expertise development following the passage of the Defense Acquisition Workforce Improvement Act (DAWIA). It begins by briefly describing the acquisition environment of the 1980s and 1990's to set the stage for the development of the DAWIA. It then examines how the DOD's approach to developing acquisition expertise was reshaped by massive changes in the size and composition of the acquisition workforce resulting from the passage of the DAWIA. Importantly, the chapter introduces key stakeholder groups and describes their roles and frames. It then explores the conflict points between the respective frames and how they mold learning technology choices. The chapter details the establishment of the Defense Acquisition University and its initial portfolio of learning technologies as a prelude to exploring the emergence of the DAU's current learning technology architecture in Chapter 5.

Setting the Stage for Destabilization: Acquisition in the 1980s and 1990s

In the late 1980's The DOD acquisition community was rocked by numerous fraud, waste and abuse cases that helped destabilize the DOD's approach to developing acquisition expertise. Famously, the DOD paid $10,000 for hexagonal wrenches and $600 for ashtrays (Jones 1999, 408). The Federal Bureau of Investigation (FBI) conducted the nation's largest defense procurement fraud investigation and reported out the results to congress in 1988. The investigation, code named "Ill Wind", resulted in the convictions of 90 companies and individuals (Bednar 2002, 288-290). Among the convicted individuals were at least six

government employees including a former Assistant Secretary of the Navy (Franz 1991). Meanwhile, weapon system acquisition programs continued to experience cost and schedule overruns.

As a result of perceived and documented poor performance and widespread procurement fraud DOD acquisition community leadership decided to re-evaluate its approach to developing acquisition expertise. The DOD sponsored a series of internal studies and initiatives aimed at discovering ways to improve the overall quality of the workforce and acquisition outcomes.

The influential idea of targeting more functional disciplines for specialized acquisition training emerged in the mid-1980s. The study group executing the 1986 internal DOD study titled "The Acquisition Career Enhancement (ACE) Program Report" made a recommendation that contributed to a major shift in how the DOD developed acquisition expertise. It suggested that the DOD institute training for *all* workforce members not just those working as program management or contracting officers. The study was the first to propose training and experience requirements for acquisition workforce members performing quality assurance, business and financial management functions in addition to contracting and program management functions (Layton 2007, 8-9). Implementing this recommendation would have meant a significant increase in number of workforce members needed to attend training. The existing Defense Systems Management College infrastructure was simply inadequate to meet the huge rise in training requirements without the additional funding (Layton 2007, 9-11). No additional funding was forthcoming and there was no significant progress on the recommendations immediately following the release of the findings. However, the study group would eventually brief their findings to a higher-level committee that was also investigating aspects of the defense

acquisition system: The Blue Ribbon Commission on Defense Management, AKA the Packard Commission (Layton 2007, 10).

The Packard Commission report influenced two later studies that led directly to the legislation that currently governs expertise development in the defense acquisition workforce. First, the DOD initiated a study in 1989 entitled the Defense Management Report (DMR) (Layton 2007, 10). The Assistant Secretary of Defense for Acquisition, John Betti, who directed the report, felt that previous reform efforts had failed in part because they came from outside the DOD. Betti believed DOD would more readily implement its own recommended improvements rather than those directed from the outside. The second study entitled *The Quality and Professionalism of the Acquisition Workforce* was conducted and published by Congress. Congress believed that the DOD acquisition workforce would benefit more from the force of statute rather than relying only on new DOD internal guidance and policy. Congressman Nicholas Mavroules made this statement about the proposed reforms: "And I believe that legislation is needed to ensure that the changes we propose are institutionalized since you and I—and our friends at the Pentagon—might not be here tomorrow" (Edgar 2005, 266). Indeed, a 1984 report conducted by the DOD's own Inspector General concluded that 67% of the intermediate and senior level acquisition workforce members had not completed training mandated by internal DOD policy. Despite its several attempts at studies and reform, the DOD had not made sufficient progress in the eyes of Congress. Congressman Nicholas Mavroules said this about DOD acquisition programs and the linkage between expertise in the workforce and acquisition outcomes: "It is obvious that acquisition poses ageless problems that come back to haunt us with amazing regularity. With each new scandal, the public loses more confidence in the Pentagon…In the past we have focused our attention on just two elements of the defense

acquisition system: the process and the structure…We clearly need to pay more attention to the people in the acquisition field. We need to train them better" (Mavroules 1991, 19)

Reframing Expertise: The Defense Acquisition Workforce Improvement Act (DAWIA)

A perspective emerged that everyone associated with acquisition work, and not just the program managers merited specialized training. That perspective led to legislation that completely disrupted the existing DOD expertise development technology structure. Congressman Mavroules, a Massachusetts Democrat and Chairman of the Investigations Subcommittee of the House Armed Services Committee (HASC) led the effort to legislate changes to the way the DOD prepared employees to work on acquisition programs. The legislation was called the Defense Acquisition Workforce Improvement Act (DAWIA) and was signed into law in November of 1990 (Layton 2007, 13).

The massive scale-up in acquisition workforce numbers resulting from DAWIA's passage and the policies issued by DOD to implement the law destabilized the incumbent DOD acquisition training/education technologies and approach for expertise development. The DAWIA required the establishment of a professional "acquisition corps" and an accompanying comprehensive acquisition workforce management system. The new "acquisition corps" consisted of both military members and civilian employees who performed *any* work supporting acquisition programs not just those who performed contracting or program management functions. This significantly increased the types and number of workers that the DOD was required to train. According to the DOD Report *Shaping the Civilian Acquisition Workforce of the Future* the DOD identified approximately 240,000 personnel who would make up the initial acquisition workforce membership following the passage of DAWIA. Study Participant 008 referred to this move as resulting in "acquisition for the masses". The size of the new workforce

would later be refined down as the Services and Defense Agencies became more discriminating about designating job positions and people as belonging to the acquisition workforce. "No one got it right at first, there were a lot of adjustments" (Study Participant 018 2014). According to the 2012 DAU Annual Report the acquisition workforce totaled 151,749 in fiscal year 2012. Professions do sometimes expand their influence by absorbing related groups (Abbott 1988). This was a move to be inclusive on a relatively grand scale. The workforce management system resulting from the DAWIA required that members of the new acquisition workforce receive specialized training tailored to their functional discipline. This was necessary in order to qualify them for employment, promotion, and career advancement. The expansion of workforce members needing training and the new workforce management policies that tied promotion opportunities to completion of training requirements threatened to overwhelm the existing training and expertise development infrastructure. When referring to this increased demand for acquisition training Study Participant 008 stated, "We just did not have enough instructors or physical space".

The Destabilizing Effect of Establishing a Profession

The DAWIA shaped the relationship between the acquisition workforce and its expertise development technologies like no other previous laws, policies or regulations. The legislation charged the Secretary of Defense with establishing policies and procedures for accessing, educating, and training DOD personnel serving in acquisition positions with the intent of professionalizing the acquisition workforce. In response to the DAWIA the DOD built a professionalization structure for the fledgling acquisition workforce (Layton 2007, 17-19). It established means to develop and formalize bodies of acquisition knowledge, instituted a credentialing process, and revamped the technology used to provide specialized training (Abbott

1988). DOD implementation policies established new organizations to develop and manage bodies of acquisition knowledge, supervise the credentialing process, and provide specialized training. In doing so, a new governance structure of competing frames emerged from these formally organized stakeholders groups.

Acquisition Expertise Development Post DAWIA

A new expertise development governance structure emerged from the passage of the DAWIA. Congress established two new positions within the statute to assist the Secretary of Defense with implementing the DAWIA mandates. First, the Director, Acquisition Education, Training and Career Development (AET&CD) would be responsible for overall workforce education and training standards. This office held the overall responsibility for making the required acquisition body of knowledge available to all members of the workforce. Second, within each Service, Directors of Acquisition Career Management (DACM) were created and tasked to assist each of existing Service Acquisition Executives (SAE) in managing the career development of their respective workforce members (Layton 2007, 17-19). The statute also allowed for a Director of Acquisition Career Management position to supervise the development of the workforce members assigned to the separate Defense Agencies like the Defense Information Systems Agency and Defense Intelligence Agency. Within the DOD acquisition community this group of Defense Agencies is commonly referred to as the "4th Estate".

The three most critical aspects of DAWIA, in relation to this research, center on acquisition workforce training and education requirements. First, DAWIA required the DOD to identify the group of employees that would constitute the inaugural acquisition workforce and

bin them into 11 prescribed career fields.[2] Second, DAWIA required the DOD to define training, education and experience requirements for advancement and promotion in each of the career fields. The requirements set marked the path for career advancement. This is not unlike setting teaching, research and publication targets for advancing from assistant professor to full professor in an academic environment. The combination of training, education and experience requirements also constitute the professional credentialing process. Essentially, workforce members are expected to possess increasingly greater acquisition knowledge and expertise as they move into positions of greater responsibility. The credentialing or "certification" process is discussed in more detail later in the chapter. Lastly, it directed the DOD to establish and maintain a Defense Acquisition University (DAU) structure. The DAWIA stated that the missions of the DAU were to provide professional education and training to the acquisition workforce and to conduct research on acquisition policy issues from an academic perspective (Layton 2007, 18-22). The statute made the DAU a primary construction and distribution point for the acquisition knowledge required of a professional workforce.

The Inaugural Acquisition Workforce Structure

The DAWIA initially mandated that the DOD use 11 areas of expertise to categorize acquisition workers. The DOD acquisition community refers to these domains of expertise as "career fields". The career fields represent functional disciplines or groups of related functional disciplines that contribute to acquisition program execution. For example, the Systems Planning, Research, Development, Engineering, and Testing career field was comprised of employees working in technical fields such as aerospace or electrical engineering either in program offices or in DOD research laboratories. Workforce members assigned to the Business, Cost Estimating,

[2] The career fields have evolved over time. There are currently 13 acquisition related career fields.

Financial Management, and Auditing career field develop, manage, and analyze budgets for acquisition programs. Manufacturing and Production specialists ensure manufacturing considerations are included in engineering designs and analyze/evaluate the production plans, processes and manufacturing facilities of defense contractors. A complete list of the initial 11 career fields is shown below in Table 1.

Table 1 Acquisition Workforce Career Fields (Public Domain)

Program Management
Systems Planning, Research, Development, Engineering, and Testing
Procurement, including Contracting
Industrial Property Management
Logistics
Quality Control and Assurance
Manufacturing and Production
Business, Cost Estimating, Financial Management, and Auditing
Education, Training, and Career Development
Construction
Joint Development and Production with other government agencies and foreign countries

Source: *The Defense Acquisition Improvement Act*. 101-510, Title 10 USC

Structures for Credentialing and Developing Bodies of Knowledge

The requirement to credential acquisition workers based in part on education and training and had a significant influence DOD's expertise development system. In response to these DAWIA requirements, the Director of Acquisition Education, Training, and Career

Development, James McMichael, working for the Undersecretary of Defense for Acquisition, Donald Yockey, defined a tiered credentialing strategy similar to the one first proposed in the Defense Management Review. They assigned each career field a three level credentialing progression designated as "Certification" Levels I, II and III (Layton 2007, 18-19, 33). The Services, Defense Agencies, and DOD Staff Organizations assign each of their personnel positions (sometimes referred in to DOD as billets) with a Level I, II, or III certification requirement depending on the degree of duties and responsibilities incumbent in the job. The entire calculus used by McMichael and Yockey in initially deciding on three tiers is unknown. The process is similar to the tiered professional education system used by the Army for training its commissioned officers and they may have used it as the model. Study Participant 008 asserted that the Congressman Mavroules lectured at the DSMC prior to the passage of the DAWIA on a proposal for professionalizing the workforce modeled after the Army system. His views may also have influenced McMichael and Yockey. The DAWIA certification also mimics the three-tiered apprentice, journeyman, master sequence found in many trades. Whatever complete origin, the tiered system does allow for the demonstration of increasing levels of expertise gained through experience and training to be used as prerequisites for awarding promotions and attaining higher levels of authority. By using training and education as credentialing requirements, it follows that the DOD needed a means to establish the training content.

In order to establish the required acquisition training content Yockey and McMichael established a Functional Board[3] for each of the career fields. The Functional Boards are responsible for determining the body of knowledge and skill sets needed within their career

[3] A Functional Board is now referred to as a Functional Integrated Product Team (FIPT) within the DOD acquisition community.

fields. Each of the Functional Boards, are led by a senior career field member known as the Functional Advisor and have membership drawn from the Services, Agencies, and DOD staff (Layton 2007, 32). The members are experienced subject matter experts for their functional areas, not educators: "They are not educational experts. They just tell you what should go in the classes based on their own experiences. They are like anybody else. They're a bunch of functional people with their own unique experiences. Some might think one thing is important- some may think another thing is most important" (Study Participant 005 2013). The Functional Boards are responsible for determining the knowledge and skills needed by workforce members in their assigned career fields. The observation made by Study Participant 005 is important because it identifies the Functional Board members as practitioners with specialized knowledge gained through experience. It also indicates intent by the board members to pass their tacit knowledge gained through their unique experiences.

The expertise required for the career fields is not determined in a uniform way. The DOD refers to the expertise needed by each of the career fields as "competencies". The Functional Boards do not follow a uniform methodology for identifying and vetting "competencies". "The FIPTs (Functional Boards) are all very different. So there is no standard way that the FIPTs (Functional Boards) work…I've been told that at one time it may have been just four guys sitting in a room that came up with the competencies" (Study Participant 017 2014). While the uniforms are not necessarily uniform, there are some common approaches.

The Functional Boards regularly contract with academic or government research organizations to assist them in their duties of determining their respective bodies of knowledge or expertise. The Engineering Functional Board hired Stevens Institute and the Center for Naval Analysis assisted several of the Functional Boards with identifying "competencies" (Study

Participant 023 2014). Each of the Functional Boards and their hired consultants use different techniques to identify and analyze workforce "competencies". The variation in identification techniques and the disparate nature of the functional areas themselves results in a wide variation in the number of "competencies" identified by Functional Boards. For example, the Information Technology career field had 12 competencies while the Test & Evaluation Career Field had 66.[4] Regardless of the number, each "competency set" represents the specialized body of knowledge and skills required by the workforce members working within an established career field as filtered by the overseeing Functional Board.

It should also be noted that Functional Boards also vary in power and influence relative to each other and the other stakeholder groups. "We are pretty small potatoes in the big sphere of things…We've never been a highlight field, its always been the PMs [Program Managers] or the engineers, or contracting" (Study Participant 014 2014).

The Director of Acquisition Education, Training, and Career Development in coordination with the Functional Boards and Defense Acquisition Career Managers set the training, education and experience standards for obtaining each of the certification levels. [5] Importantly, it is the Directors of Acquisition Career Management that serve as the credentialing or "certification" authority for the Services and 4th Estate Defense Agencies (Layton 2007, 48). Workforce members must achieve the certification level designated for their current job position within 24 months of being hired into that position or risk dismissal. Workforce members are required to achieve a Level III DAWIA certification to hold senior technical and management

[4] The Information Technology Career and Test & Evaluation evolved into individual career fields after the identification of the original 11 DAWIA career fields.
[5] The position of Director, Acquisition Education, Training and Career Development no longer exists. Many of it functions are now performed by the Director, Human Capital Initiative (HCI) a position established in the early 2000's.

positions in acquisition organizations. Figures 5, 6, and 7 below provide examples of the training, education and experience requirements required to achieve a Level I, II, and III certification. The figures describe the requirements for members of the Information Technology career field. Note that there are general "acquisition" training courses that are required for all career fields and "functional" training courses that are specific to a career field. The course numbers for each of these categories are listed in the table. This example career field has no formal education requirement. Other career fields such as Engineering may require a Baccalaureate or Masters degree in a particular academic discipline. The amount of on-the-job experience required at each certification level also varies by career field. The requirements build on each other. That is to say that workforce member must meet the requirements for Level I and Level II before moving on to tackle the requirements for Level III. However, the experience times listed for each level are not additive. A member of the Information Technology career field needs a total of four years' experience to achieve a Level III certification not seven years (one at Level 1, two at Level II, and four at Level III).

Figure 5 Level I Certification Standards – Information Technology (Public Domain)

Core Certification Standards (Required for DAWIA certification.)	
Acquisition Training	ACQ 101 Fundamentals of Systems Acquisition Management
Functional Training	IRM 101 Basic Information Systems Acquisition Untill 1 October 2016, SAM 101 may be substituted if completed after 15 Nov 2005
Education	Formal education not required for certification
Experience	1 year of acquisition experience in information technology

Figure 6 Level II Certification Standards – Information Technology (Public Domain)

Core Certification Standards (Required for DAWIA certification.)	
Acquisition Training	ACQ 202 Intermediate Systems Acquisition, Part A ACQ 203 Intermediate Systems Acquisition, Part B (R)
Functional Training	IRM 202 Intermediate Information Systems Acquisition (R)
Education	Formal education not required for certification
Experience	2 years of acquisition experience in information technology

Figure 7 Level III Certification Standards – Information Technology (Public Domain)

Core Certification Standards (Required for DAWIA certification.)	
Acquisition Training	● None Required
Functional Training	● IRM 304 Advanced Information Systems Acquisition (R) ● SAM 301 Advanced Software Acquisition Management (R)
Education	● Formal education not required for certification
Experience	● 4 years of information technology or software-intensive systems acquisition experience

Source for Figures 5-7: DAU iCatalog Online

Expanding Expertise Development: The DAU as a Consortium

The passage of DAWIA and DOD's subsequent implementation policies undermined the existing single school house approach to transferring knowledge and expertise. The DOD acquisition community would no longer be able to focus its main effort primarily on training key leaders and managers. Prior to the passage of DAWIA the DOD had trained a select group of employees to manage major acquisition programs by sending them to the Defense Systems Management College for 20 weeks. It would now have to develop and provide training not only for program managers but also for those working in the other 10 career fields.

The existing technology could not handle the increased demand for training. The DAWIA specifically directed that the Defense Systems Management College be a component of the DAU structure. However, the Defense Systems Management College was only graduating approximately 800 students per year from its Program Management Course (Study Participant 022) and the initial acquisition workforce was numbered at 240,000 (Layton 2007, 17). The Defense Systems Management College's surge capacity to produce graduates from its limited number of short, functional courses is not well documented. Nevertheless, multiple research participants indicated that the new demand far exceeded any available surge capacity. "There was no way we could provide that much classroom training" (Study Participant 012 2014). "We

were limited to 16 sections because we had 16 classrooms" (Study Participant 002 2013). The DOD leadership subsequently deemed the existing model of a single schoolhouse conducting lengthy graduate-level training to a small population of select students to be inadequate. The DOD was faced with the problem of establishing a DAU structure capable of accommodating the large increase in students. Additionally, the DAU structure would have to provide a much wider array of training courses than currently existed to accommodate the 11 different designated career fields. To meet the new demands DOD expanded the DAU structure far beyond the existing Defense Systems Management College infrastructure.

Yockey, weighing the recommendations of two DAU implementation study groups, determined the best course of action was to establish the DAU as a consortium of existing DOD schools (Layton 2007, 21). As had been done with other aspects of implementing DAWIA, the Secretary of Defense assigned Donald Yockey the responsibility for implementing the DAU structure. The DOD needed to quickly increase student throughput and construct a variety of new career field specific courses. Congress assigned the DOD a deadline of August 1, 1992 to have the DAU operational (Layton 2007, 17). The initial consortium was comprised of the Defense Systems Management College and 14 other training/educational organizations. Yockey also established a DAU Headquarters to coordinate the functions of the consortium members. It should be noted here that with the exception of the DSMC, none of the consortium schools' primary focus was acquisition training. The impact of this mission mismatch will be discussed later in the chapter. Despite absence of shared focus, the consortium structure met the two requirements mandated in DAWIA; that acquisition training be centrally managed and that the Defense Systems Management College be included in the DAU structure. Yockey envisioned that the consortium would operate similarly to a state university with branch campuses and

colleges teaching specialized disciplines (Layton 2007, 22-25). The DAU Headquarters (HQ) and consortium schools developed the required courses and published schedules. The DAU HQ also established teaching responsibilities based on capabilities. "Not everyone taught every course…they didn't have the faculty…centers of excellence popped-up for contracting and budgeting for example" (Study Participant 002 2013). The DAU leadership met the congressionally set deadline. The DAU opened for business on August 1, 1992 prepared to conduct 900 course offerings during its first year of operation (Morton 1992, 17). The original consortium member organizations are listed below in Table 2.

Table 2 Initial DAU Consortium Membership

Air Force Institute of Technology
Army Logistics Management College
Army Management Engineering College
Defense Contract Audit Institute
Defense Logistics Civilian Personnel Support Office
Defense Systems Management College
European Command Contracting Training Office
Information Resources Management College
Lowry Technical Training Center
Naval Postgraduate School
Naval Supply Systems Command Regional Contracting Center
Naval Facilities Contracts Training Center
Naval Warfare Assessment Center
Navy Acquisition Management Training Office

Office of the Assistant Secretary of the Navy for Research, Development and Acquisition

Stakeholder Roles, Frames, and Tensions

The collision of technological frames held by three primary stakeholder groups molds the technologies used to transfer knowledge and develop expertise in the acquisition workforce. Prior to its opening DAU was already operating in an environment shaped by its interactions with two influential stakeholders within the governance structure; the Functional Boards and Directors of Acquisition Career Management. The DAU, the Functional Boards and the Directors of Acquisition Career Management form a triad of primary stakeholders that share a common goal – a more knowledgeable and expert acquisition workforce, but their differing priorities were and continue to be regular sources of conflict. Study Participant 022 had this to say about the stakeholders' relationship: "Each one has a different perspective on the same objective -- which is the quality and professionalism of the acquisition workforce." A graphical representation of these stakeholders and their frames is shown in Figure 6 below.

The Functional Boards are most concerned with the quality and completeness of the education and training received by members of their career fields. "…I need the best systems engineer I can get, so more training for those guys is better" (Study Participant 001 2013). "The perspective of the FIPTs is that quality should be as high as it can be" (Study Participant 022 2014). As noted before, they are responsible for determining the competencies required in their respective career fields. The Functional Boards communicate the competencies to the DAU for development into courseware and other learning assets. The Functional Boards annually review the DAU courses within their jurisdiction for adequacy. Based on their review findings, they either certify the courses as meeting their training goals or de-certify the courses for being sub-

standard. It should be noted here that rarely, if ever, does the Functional Leader or any of the career field representatives on the board hold formal credentials for adult education. That fact impacts how the DAU perceives the Functional Boards' ability to exercise proper judgment on the courses outside of validating content. Nonetheless, the Functional Boards' power to de-certify DAU courses give them tremendous leverage within the group of stakeholders. Their focus on quality and completeness often necessitates increasing the duration of training which increases the time it takes for workers to become certified. Often the decision by a Functional Board to add more competencies for workers to master equates to increased time away from the workplace and increases the travel expenses for the Services and Agencies. Importantly, the Functional Advisors, as leaders of the Functional Boards do not control a training budget. However, they regularly increase the number of competencies required by their workforce members. "Their perspective (the FIPTs) is that more is better" (Study Participant 001 2013). "There is constant pressure to add more in, to add more days" (Study Participant 019 2014). The DAU then must then source the time and money required to revise the current courses or develop new ones. The Functional Boards have been perceived by the other stakeholders as being somewhat indifferent to cost as they exercise their responsibilities. When discussing this point Study Participant 019 noted "They (the FIPTs) don't have to pay the bill".

The Directors of Acquisition Career Management, and their support staffs, are primarily concerned with ensuring that the Services and Defense Agencies have sufficient numbers of qualified workforce members. Therefore, the Directors place significant emphasis on student graduation rates and throughput for the DAU courses. "They care about throughput…will DAU be able to get my people into the classes and certified?" (Study Participant 017 2014). Higher graduation rates and increased throughput improve the probability that there are adequate

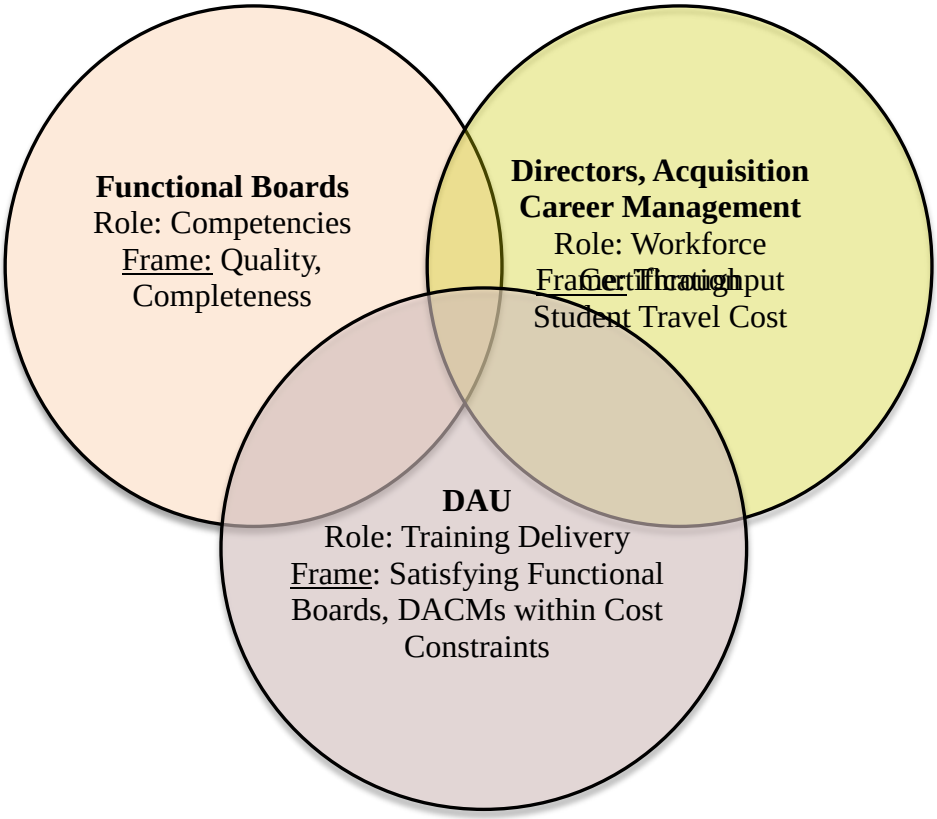
numbers of workers at the correct certification levels to fill each of the duty positions. The Directors are also sensitive to balancing training with actual workload. "They (the DACMs) will put the brakes on things that take folks away from jobs for too long" (Study Participant 022). Finally, the Directors are concerned with individual career development. By insisting that DAU provides an adequate number of training "seats" in the correct training locations the Directors ensure that acquisition workers in their Service or Agency are afforded sufficient opportunity to attend training required for promotions. Study Participant 016 simplified the priorities of the Directors stating: "The DACMs (Directors of Acquisition Career Management) are worried about butts in seats". The Directors of Acquisition Career Management control the student travel budget. They consider the impact to travel cost in formulating their positions on teaching and learning technologies proposed by the Functional Boards and the DAU.

One of the DAU's primary roles is to translate the competencies determined by the Functional Boards into learning technologies. "Theoretically, they [the FIPTs] tell us what to teach, and we tell them how we are going to get that across to the students" (Study Participant 005 2013). Early in the DAU's history, its learning technologies conformed to the classroom-teaching model established by the Defense Systems Management College and its predecessors. Resident classroom courses were also the primary teaching technology employed by the other consortium members. The DAU has the responsibility for determining the appropriate pedagogical approaches and student learning assessment methods based on the competencies being taught.

The DAU is also responsible for providing the courses in sufficient numbers and at the desired locations to meet the workforce needs as determined by the Directors of Acquisition Career Management. The DAU controls a budget that includes funding for curriculum and

infrastructure development and sustainment as well as instructor travel. The DAU leadership considers cost as a significant factor in its learning technology selection decisions. The DAU is concerned with "making the best use of limited resources" (Study Participant 022 2014). However, it is sometimes the case that other stakeholders dictate technology choices to the DAU. "Sometimes DAU is forced to buy the car without knowing what the price tag is" (Study Participant 019 2014).

Figure 8 Major Stakeholder Roles & Technological Frames



The learning technologies for developing acquisition workforce expertise were and are still shaped by the interaction between these competing frames. Study participant 013 described the interaction produced by the competing roles and responsibilities of these three stakeholder groups as "natural dialectic tension". In fact, Yockey and McMichael established the structure

with the intention of inserting checks and balances between the priorities of the Functional Boards, DAU and the Directors of Acquisition Career Management. “I and my team designed it this way—to have this creative tension” (Study Participant 022 2014). The situation superficially resembles how the three branches of the U.S. government operate. However, there are no formalized veto powers among the stakeholders other than the ability of the Functional Boards to de-certify DAU curriculum.

SCOT provides a framework to examine the relationships between stakeholder groups (relevant social groups) and examine the conflicts points between their perspectives (technological frames) (Bijker, Pinch, and Hughes 1989, 32-40). The stakeholders achieve closure on learning technologies through rhetoric and negotiation. The following three generalized examples of the stakeholder groups moving to shape learning technologies in accordance with their perspective/frames have been constructed from several real life events/actions described during interviews with study participants. They are illustrative of the tension between the stakeholders’ technological frames and demonstrate the battle for dominance between the technological frames of quality, throughput, and cost.

Example 1: The Functional Board Perspective – A Functional Board proposes that the DAU cover additional competencies in its courses. The DAU analyzes the proposed changes and determines that the additions will require a significant increase in the number of training days. In this case the Directors of Acquisition Career Management may resist. The Directors protest on the basis of impact to their budget for student travel, increased time to certify their workforce, and lost productivity stemming from additional time away from the workplace. DAU may then argue that if the training duration is to remain unchanged, then some competencies must be dropped from the curriculum or the coverage of the competencies be relaxed. The

Functional Boards, focused on quality and completeness, will often continue to press for the additional time.

Example 2: The Directors of Acquisition Career Management Perspective – The Directors attest that a classroom course length is too long and is unacceptably interfering with their acquisition organizations' ability to meet workload requirements and is too costly for their travel budget. The DAU responds by proposing that it move some of the course content online or to teach using video teleconferencing technologies. However, the Functional Board with course oversight responsibilities argues that both proposed options reduce instructional quality below acceptable standards.

Example 3: The DAU Perspective – The DAU determines that the desired learning outcomes for a set of competencies requires that the course seats be filled with a diverse mix of students from each of the Services and Agencies rather than a homogenous group from the single Service or Agency represented at a particular training location. The Directors of Acquisition Career Management contest the requirement because it increases their cost of student travel and complicates their scheduling, and hinders the ability to optimally fill their training seat quotas.

The interaction between the stakeholders is at times quite contentious. Markedly contentious events occur when a stakeholder group is perceived to step outside of the bounds of its assigned responsibilities and directly challenge another's authority and expertise. These conflicts invoke strong opinions and muddles authoritative claims to expertise made by the stakeholders. On more than one occasion a Functional Board has not only directed what competencies are to be included in a course, but also dictated the course length and learning technologies. These actions are inconsistent the DAU's view of roles and expertise. "The FIPTs are in no way educational experts…they can't tell you the best way to teach something…that is

our (the DAU) job" (Study Participant 005 2013). In at least one instance a Functional Board has dictated teaching locations and course length in addition to what competencies to include in the course. Study Participant 018 recounted the event this way: "The functional leader said this entry level course – it will be classroom, it will be four weeks long, and it will be taught in residence you will not take it to customer sites." This approach directly challenged the DAU's authority as the expert in acquisition curriculum development and delivery. It also challenged the authority of the Directors of Acquisition Career Management to establish appropriate course locations to service their workforce.

Technological Momentum and DAU Learning Technologies

The obdurate nature of some pre-existing technologies along with the collisions between the three primary stakeholder groups' perspectives shaped the DAU's initial technology architecture. All of the consortium institutions were comprised of brick and mortar classroom facilities and staffed by faculty accustomed to teaching students in-residence. Although in 1993 Jones International University became the first completely online accredited institution in the United States to offer degree programs, classroom based instruction was still the predominant technology of the time (Crotty 2012). The consortium schools maintained their classroom-based trajectory as they developed and delivered new acquisition courses.

The DAU consortium's continued reliance on an in-resident classroom based approach to expertise development coupled with perceived curricula quality issues and administrative deficiencies contributed to a relatively short period of stabilization. DAU's ability to expand its enrollment was limited by physical classroom space, number of available faculty and time available to teach acquisition courses. As mentioned previously, acquisition training was not the primary mission of many of the consortium members. For example, only 3% of the students at

the Naval Postgraduate School were enrolled in acquisition courses (Layton 2007, 28). With the exception of the Defense Systems Management College, acquisition training at consortium schools had to compete with other, potentially higher priority, missions for classroom space and faculty time.

The DAU also experienced problems ensuring uniformity of course content and the quality of its delivery. The implication of this situation was that the workforce members did not have adequate access to the complete body of acquisition knowledge required of their respective career fields. "Everybody [the consortium members] had there own areas of focus…little centers of excellence and that was all they wanted to teach" (Study Participant 002, 2013).

The DAU's control over the budget for acquisition curriculum development and delivery among the consortium members was insufficient to establish and maintain acceptable quality levels and impacted expertise development. Particularly, the top DOD acquisition leaders were unhappy with the time it took for their policy issuances to appear in acquisition courses (Anderson, Hardy and Leeson 2008, 5). The DAU provided a percentage of the consortium members' budget based on their contributions, but their workload priorities and faculty hiring guidelines were still set by their parent Services or Agencies (Layton 2007, 28). The DAU Headquarters found itself challenged to operate as an effective central controlling authority. Study Participant 015 remarked: "It was like the Articles of Confederation – We couldn't effectively manage the enterprise". There were other conflicts that contributed to ineffectiveness of the consortium. "Everyone was in competition with each other for a piece of the pie [budget]…DSMC crowd didn't appreciate having this new headquarters calling the shots…and they didn't think much of the headquarters staff – saw them as unqualified" (Study Participant 003 2013).

It addition to the frustration expressed by the top leadership, a significant portion of students were also unhappy with the curricula. DAU conducted a survey four years after the consortium began operating. In that survey 22 percent of the students complained about the quality and difficulty of the course material. (Anderson, Hardy and Leeson 2008, 5)

The different administrative procedures and support technologies at each of the member institutions also contributed to the acquisition community's dissatisfaction with the state of its career training. Each of the consortium members inherited policies, procedures and priorities from its parent Service or Agency. The DAU headquarters experienced problems integrating the various registration systems and logistics support functions. The differences in registration systems caused measurable frustration among students and supervisors. In the same survey mentioned above, 75 percent of supervisors experienced difficulties in getting their employees enrolled in a timely manner. The survey also revealed that 30 percent of students surveyed complained about the difficulties in navigating the various registration systems (Anderson, Hardy and Leeson 2008, 6).

Paradigm Shift On The Horizon

By 1998, the senior DOD acquisition leadership decided that the level of stakeholder satisfaction was substandard and warranted another restructuring of the expertise development technologies. They followed the commonly traveled path of previous leadership teams and directed the conduct of yet another study (Layton 2007, 89). The recommendations from the study that the DOD acquisition leadership decided to implement would radically change the structure and learning technologies employed by the DAU to construct and disseminate acquisition knowledge.

The senior DOD leadership also believed that the incumbent DAU President had to be replaced in order achieve the desired organizational and technological changes at the DAU. In 1999, the Undersecretary of Defense for Acquisition, Technology and Logistics installed recently retired Brigadier General Frank J. Anderson, the Commandant of the Defense Systems Management College, as the President of the DAU (Layton 2007. 90). Anderson immediately enjoined DAU on a mission to re-imagine and re-invent the way it developed expertise in the acquisition workforce by breaking through the brick and mortar paradigm.

Chapter 5

Moving Expertise Development Outside the Classroom

Introduction

This chapter examines the establishment of a new learning construct for developing expertise within the acquisition workforce. The new learning construct emerged amidst the ensuing clash between academic and corporate frames and cultures. The chapter describes how the new learning construct spawned technologies for learning that operated outside the classroom and reshaped the DAU faculty and organization. The chapter also describes the impacts of the DAU's transition from academic consortium to a unified corporate university, or career, university.

From Academic Institution to Corporate Training Division

The perspectives on how best to develop expertise continued to change. In 1999, The Undersecretary of Defense for Acquisition, Technology and Logistics, Dr. Jack Gansler directed the new DAU president, Frank Anderson, to restructure DAU. Specifically, Dr. Gansler directed President Anderson to consolidate the DAU into a unified corporate university. The DAU's migration to a corporate university structure has its roots in a more general shift towards commercial business practices previously launched by senior DOD leadership (Anderson, Hardy and Leeson 2008, 6).

During the late 1990s, the DOD senior leadership attempted to inject corporate business practices and philosophy into its strategic management processes. The movement was referred to as the "Revolution in Business Affairs" (RBA). Dr. Gansler commissioned a study aimed at finding means to accelerate the adoption of effective commercial practices within the DOD

acquisition system (Layton 2007, 94). That study, entitled "*The Commercial Business Environment: Accelerating Change Through Enterprise Teaming*" included a recommendation that DAU restructure itself into a corporate university: "The DOD should model training for the acquisition and technology community on a corporate university, and use that training as a source of knowledge, skills, and tools that senior leaders can use to sustain positive change throughout the entire Defense community."

Most likely the reader is now struck with the same question that the DAU leadership faced in 1999 – "just what is a corporate university". The Gansler study did provide a definition that also detailed some specific functions: "A corporate university is a corporate-sponsored workplace learning enterprise for the entire organization…corporate universities act as change agents in their parent organizations…corporate universities provide a continuous learning capability". There is evidence that few, if any, of the DAU leadership were initially familiar with the concept of corporate universities. Frank Anderson indicated in his book, "Leading a Learning Revolution", that the incumbent DAU leadership team had no experience with the concept: "The very idea of a government corporate university was revolutionary. No one had actual experience" (Anderson, Hardy and Leeson 2008, 9). Study Participant 007 recounted in their interview how Anderson directed that the entire DAU leadership team read a specific treatment of corporate universities prior to a strategic re-organization planning conference: "I had to read this book…Jeanne Meister's book on corporate universities. Frank had the entire leadership group read the book before our strategic conference". Despite having no experience with corporate university implementation the DAU leadership forged ahead with the reconfiguration effort.

Gansler's push for this major restructuring of the DOD's acquisition expertise development institution stemmed from three perceived deficiencies in the consortium structure (Anderson, Hardy and Leeson 2008, 8-10). The problems were identified by both the DOD acquisition leadership and congress via investigations conducted by the General Accountability Office (GAO).

First, a principal complaint by the senior acquisition leadership was that the DAU consortium schools were too slow to incorporate policy changes into their classroom-based curricula. The senior acquisition leadership wanted their most current policy and guidance disseminated promptly so that it could be interwoven with the current state of acquisition practice and be quickly internalized by the acquisition workforce. Timeliness in policy dissemination is important to DOD leaders because they use policy implementation to affect change by shaping processes, practices and culture. The Gansler study specifically noted that one of the primary purposes of a corporate university is to act as a change agent: "A corporate university is not merely a provider of education – it is a corporate-wide change agent". That is to say that the institution acts as a tool of the corporate leadership for facilitating organizational change by inculcating enterprise values, culture, goals and standard processes. This construct provides a mechanism for the top-level acquisition leaders to supplement the bodies of acquisition knowledge developed by the Functional Boards. The top-level leadership already influences the bodies of knowledge because they appoint the Functional Leaders, but the corporate university construct gives them direct pipelines via the DAU's learning technologies.

It is not a far stretch to imagine that Gansler viewed a restructured DAU as a tool for realizing the "Revolution in Business Affairs" and acquisition reforms he championed as a subset of the overall "revolution". The annual performance report published by the DAU

recounting its major efforts in fiscal year 2000 lists integrating DAU capabilities with that of the Office of the Secretary of Defense's Change Management Center as a goal of its new corporate university model. "Supporting the Revolution in Business Affairs requires us to serve as change agents in addition to our traditional role of providing DAWIA instruction". DAU's additional role as agent of change/mouthpiece of top acquisition leadership did influence how some of its learning technologies were employed. Specific impacts are discussed in the next chapter.

The second perceived deficiency dealt with the location of expertise development rather than delays in knowledge transfer. In August 1999, the Government Accountability Office (GAO) investigated how Boeing, Motorola, Ford and IBM trained their employees and issued a report recommending that the DOD should provide training directly to the acquisition program offices to improve acquisition outcomes (Layton 2007, 84). The report suggested DOD establish training targeted specifically for problems facing acquisition program offices and to conduct the training at the program offices' locations. The recommendation was based on GAO's understanding of Boeing Corporation's practice of sending training teams directly into their aircraft research and development shops and production facilities to conduct training specifically tailored for the organization. The existing DAU academic consortium structure was not designed to accomplish such worksite support. The consortium, with its classroom course focus and faculty constraints was incapable of executing this type of action.

The Government Accountability Office recommendations also influenced the DAU's pedagogical approach. The same GAO report that suggested that the DAU conduct training at program office locations also recommended that DAU increase the use of case studies to teach how to implement the most current, best acquisition practices.

The DAU decisions to implement the GAO recommendations within its new corporate university structure had impacts beyond pedagogy. DAU's transition to a corporate university structure did not lend any obvious advantages in implementing case-based teaching methods – many traditional colleges and universities employ the approach with success. However, the decision by the DAU leadership to pursue a corporate university structure did facilitate a change in faculty demographics that could be viewed as advantageous to case-based instruction. With the move to a corporate structure came the direction from the DAU leadership to focus on hiring expert acquisition practitioners as faculty. The DAU began to target former program managers, lead systems engineers, and contracting officers who had extensive experience working major defense acquisition programs as either uniformed or civilian DOD employees. In the past, the DAU forerunners had sought for a teaching faculty that consisted of mix of staff from academia and government acquisition programs (Acker 1986, 25). Collins and Evans have argued that specialized tacit knowledge is transferred by practitioners, meaning those possessing contributory expertise: "Interactional expertise in a specialism seems to be learned exclusively through interaction with communities which have contributory expertise in the specialism, not persons who have interactional expertise in that specialism" (Collins and Evans 2007, 36). The same potential for "practitioner faculty" to aid the transfer of tacit knowledge would also apply to the practical exercises, simulations and facilitated discussions that are part of the curricula.

The change in faculty demographics triggered additional organizational and technology changes. The DAU had to build the capability of its faculty to deliver case-based instruction. To that end it set up a series of internal "professional development" courses for faculty to learn how to write and facilitate case-based learning events. The DAU set up additional "professional development" courses to assist the "practitioner faculty" with little or no educational training to

become effective classroom instructors and facilitators. The DAU established an organization responsible for producing and conducting the "professional development" courses staffed by credentialed educators.

The DAU's instantiation of the corporate university model placed it in a position to address the two deficiencies noted by Gansler and the General Accountability Office but caused significant social upheaval. Reorganized as a corporate university the DAU became more responsive to policy changes and act as a change agent. "That was Anderson's deal, he wanted us to be ready with updated course material the minute a new policy dropped" (Study Participant 003 2013). The General Accountability Office had recommended that specialized training be conducted in the program management offices. The corporate university model provides more knowledge transfer activities outside of the traditional classroom setting because it locates training closer to, or even within, the workplace proper. The corporate university model, and the specific geographically diverse version adopted by the DAU leadership provided a means to implement that recommendation.

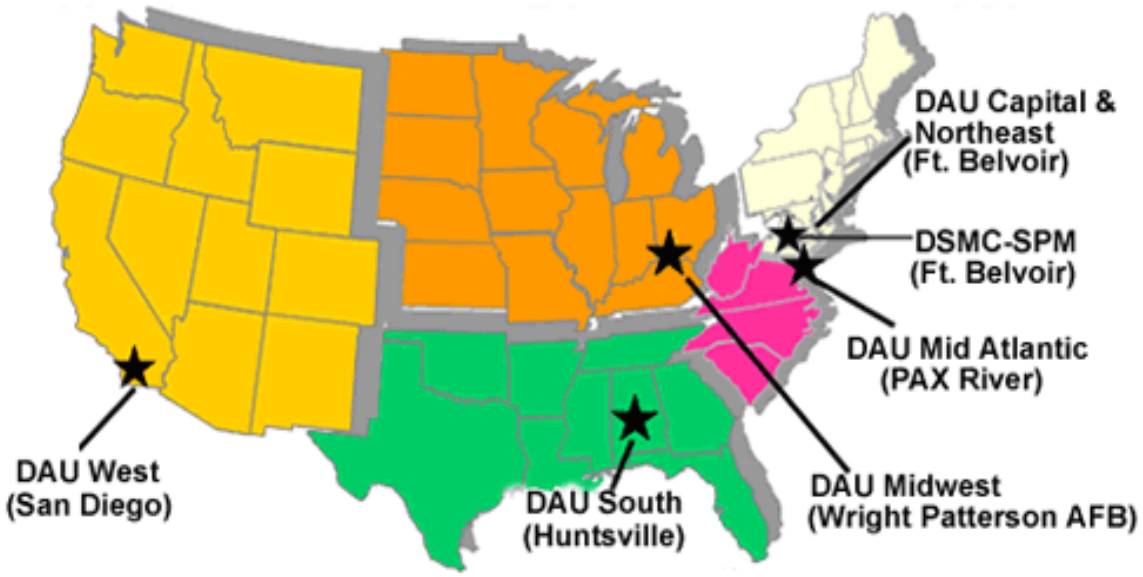
Expertise Development Comes To A Location Near You

The DAU moved expertise development technologies closer to the workforce. Frank Anderson and his leadership team directed that the DAU structure be redesigned around the existing Defense Systems Management College and five regional campuses (Layton 2007, 114). Anderson chose the regional locations based predominantly based-on where the highest concentration acquisition program offices and workforce members were found (Layton 2007, 115). Determining the locations was not a trivial task: "I was involved in that effort, getting the information was a nightmare…the Services didn't have complete databases…the personnel systems really didn't support that type of query…it took forever" (Study Participant 018 2014).

However, even after the significant effort expended to collect the data and analyze the numbers, at least one regional location was reportedly influenced as much by inter-service politics as by actual numbers of acquisition workers near the location: "Pax River [DAU Mid-Atlantic Region] is there only because the Navy squawked about only having San Diego [DAU West Region]" (Study Participant 002 2013). A map of the DAU regional locations is found below in Figure 9. This approach is quite different than letting the locations be decided by the presence of pre-existing training organizations as occurred with the consortium structure. Anderson's configuration based on workforce density put the DAU faculty closer to the actual workplaces of their potential students and afforded greater opportunities for direct workplace assistance. Notably, the Defense Systems Management College remained intact and located at Fort Belvoir close to the center of acquisition power in the Pentagon.

This arrangement also had the advantage of reducing the costs incurred by students and instructors traveling for training. "The DAU budget was flat so relocation helped lower travel dollars…we were spending $40 million a year on student travel" (Study Participant 012 2014). The cost-savings measures were important because the proceeds would be used to realize other, new priorities. Gansler's study, in addition to calling for DAU to reconfigure into a corporate university and increase its use of case-based instruction, recommended that the DAU increase its use of technology-based instruction. Technology-based instruction in the context of the study means web-based or intranet-based instruction. The DAU's employment of technology-based instruction will be discussed later in the chapter.

Figure 9 DAU Regional Campus Locations (Public Domain)



Source: 2003 DAU Annual Report

Social Turmoil

The transition to a more business-oriented corporate structure ignited a conflict between a portion of the faculty and Anderson's leadership group over DAU's technology trajectory. Here again SCOT provides a useful lens through which to view the conflicts between stakeholder/relevant social groups and their perspectives/frames. Congress had mandated that the Defense Systems Management College would be part of the consortium. The College remained a large and influential organization within the new unified corporate university structure. Its faculty brought with them 30 years of in-resident, graduate school culture. Some members of this faculty group had been employed with the Defense Systems Management College since its establishment in 1971. According to Anderson and others on his leadership team, the resisters failed to acknowledge the problems that clinging to the traditional academic, in-resident course

only, graduate school model had caused: "DAWIA had changed everything. Everything had changed around them. But they [the resistant faculty] couldn't see it. Wanted to keep doing only what they had been doing" (Study Participant 013 2014). In *Leading a Learning Revolution* the authors present the cultural mindset of the faculty as arrogant and stubborn: "…we believed that anyone who criticized the university just didn't understand education. We had convinced ourselves that we were right and anyone who disagreed was uniformed. We believed that in regard to education and training, we always knew best" (Anderson, Hardy, and Leeson 2008, 31). Anderson and his leadership team rejected the opposition's view that dismantling the long-standing academic model in favor of a corporate university structure would lower instructional quality. Anderson and his leadership team categorized the opposition's views as tainted by self-interest because the opposition also complained it would mean a loss of their academic titles and prestige. "Everyone was up in arms when they would no longer be full or associate professors or whatever" (Study Participant 002 2013). The conflict was so intense that a small group of senior DAU faculty, with the support of the Provost, attempted to have Anderson removed as president. The group waited until Anderson was away from Fort Belvoir on business and then visited his immediate superior at the Pentagon to argue for his dismissal. "They waited until he [President Anderson] was TDY [on a business trip], then they all went up to the Pentagon and told his boss that he wasn't the guy for the job" (Study Participant 002 2013). Anderson survived "the coup attempt" as it came to be referred. From that point he worked diligently to convert the resistant faculty to the technological frames of his superiors and to the corporate university paradigm. Those who could not be converted were removed from leadership and managerial roles: "Anderson talked a lot about getting everyone on the bus. If you didn't want to get onboard he was prepared to leave you at the stop" (Study Participant 001 2013). Several

voluntary left the DAU (Anderson, Hardy & Leeson, 2008, 41-42). In some cases Anderson and the leadership team used reorganization as a means of reducing the amount of influence opposition leaders could exert in advocating competing approaches. Anderson eliminated the office of the Provost and gave responsibility for curriculum development and quality control to an entirely new entity - the Curriculum Development Support Center (CDSC) - and divided other Provost duties amongst existing organizations. "He [Anderson] used the reorg [reorganization] to shift power…that's how PRM ended up with scheduling" (Study Participant 002 2013). Anderson and the leadership team touted the curriculum development center as the solution to the DAU's dated curricula and its inability to integrate new policy into courses quickly. This organizational change did address a major compliant from the DAU's stakeholders. It also allowed Anderson to all but eliminate the power and influence of the Provost who had helped lead the "coup" attempt. Anderson and the DAU leadership team termed the closure resulting from this process of enrollment and marginalization "alignment" (Anderson, Hardy and Leeson 2008, 22).

The DAU was more responsive to some technological frames than others. As part of this "alignment" process, Anderson and the leadership team identified the privileged stakeholder groups of the evolving socio-technical learning enterprise. Anderson's discussion of the topic in his book also reveals the stakeholder groups with less influence and voice. Anderson targeted the following groups as the primary shapers of the new DAU: Congress, Industry, the Secretary of Defense, the Under Secretary of Defense for Acquisition, Technology & Logistics, the Service Acquisition Executives, and the Functional Advisors/Leaders. Anderson also lists the various acquisition program offices and the workforce members, now numbering 130 thousand, as customers. However, other than being referenced in a graphic, there is no mention of how the

DAU would directly address the concerns of the workforce members. Additionally, Anderson only mentions the DAU faculty as a stakeholder group during descriptions of how the leadership team worked to enroll the faculty into the dominant technological frames represented by the more powerful stakeholder groups (Anderson, Hardy and Leeson 2008, 33)

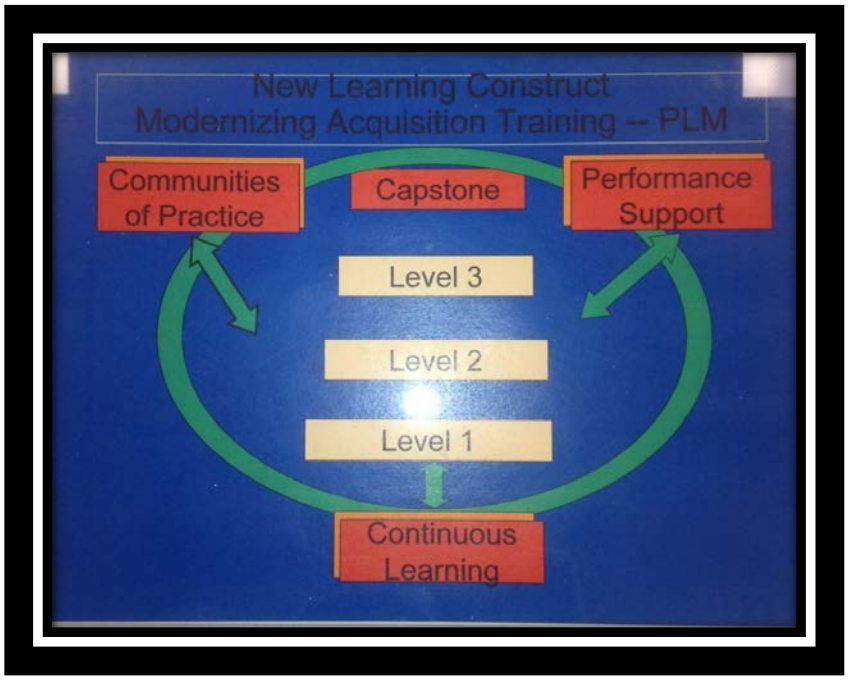
A New Guiding Model for Learning Technologies and Expertise Development

As part of the transition to a corporate university structure the DAU leadership began to develop a new framework to describe its learning technologies. The DAU refers to them as "learning assets". By October of 2002 DAU leadership had matured the framework sufficiently to give it a name -- the Performance Learning Model (PLM) (Defense Acquisition University 2003). The PLM would serve later as a guide for investments in new learning technologies. The origin of the model is somewhat contested. Anderson claimed that he and one of the most trusted members of his leadership team drew up the idea on a napkin during a lunch discussion during a leadership conference focused on strategic planning. (Anderson, Hardy and Leeson 2008, 108) At least one other study participant claimed authorship, or at least making the refinements required to make the model operationally viable (Study Participant 004 2013). Other study participants indicated that it emerged over a period of time as the result of group authorship with contributions from all members of the leadership team. Anderson and his team may not have originally created the PLM as intentional long-range strategy, but rather pieced it together to make the DAU's existing and emerging learning assets more marketable. "Not sure Frank had coherent vision…had some goals…kept moving towards goals" (Study Participant 007 2013). "The other thing he [Anderson] could do was package stuff. He took things that existed or were coming and then not just saying we got this and this, but putting it into a catchy construct. So he took what we were already doing--training and some other ideas that were being

read about…and that became the Performance Learning Model, which is far zippier when you go talk about it in a presentation – it engages people" (Study Participant 012 2013).

In its initial form, the PLM was comprised of five major categories of "learning assets": the courses required for credentialing or "certification" courses; direct support to program offices which was termed "Performance Support"; online information exchange forums which were termed "Communities of Practice"; short, online, topical courses which were termed "Continuous Learning"; and the post credentialing executive training or "Capstone" courses. A photo of the initial depiction of the model is shown below in figure 10. Note that in figure 10, the credentialing or "certification" courses are contained in the blocks labeled Levels 1, 2 and 3.

Figure 10 Original Performance Learning Model (Public Domain)

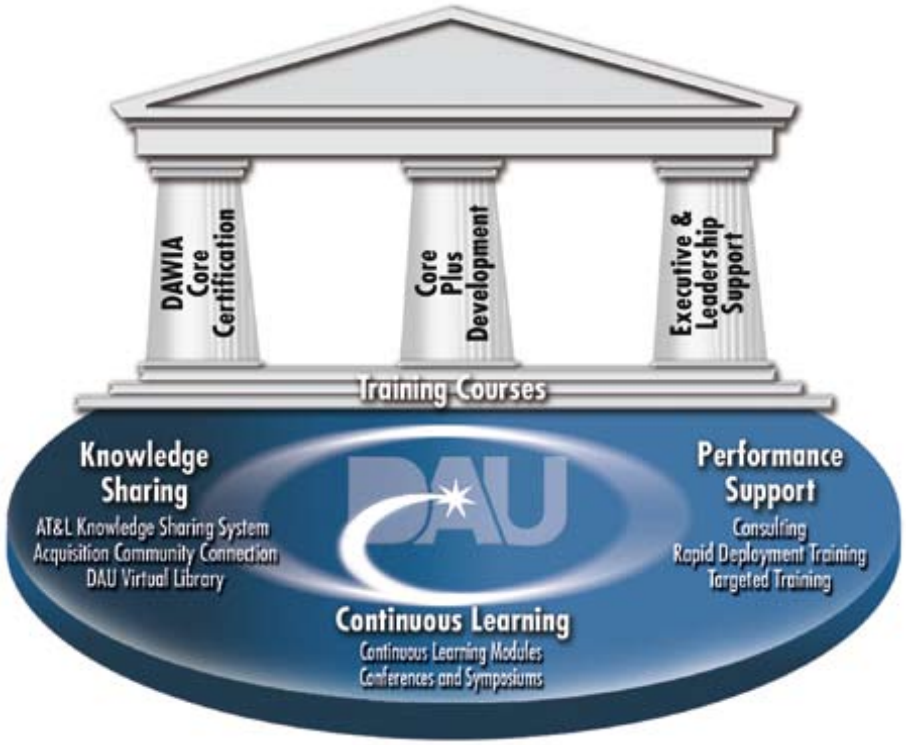


The PLM represented an evolution toward a more comprehensive, workforce aware approach to learning and knowledge dissemination technologies. It represented the DAU leadership's plan to burst the boundaries of the in-resident classroom approach that dominated

the first 40 years of acquisition training. The DAWIA credentialing or "certification" courses remained a pillar of the DAU's learning structure. The Capstone courses are senior-level courses available after credentialing. However, Performance Support, Continuous Learning, and Communities of Practices were all fresh extra-classroom additions to the DAU's knowledge transfer toolset.

In the decade between 2002 and 2012, the DAU leadership further refined the PLM. The final graphical depiction of the PLM is provided below in Figure 11. In the refined visual depiction the Level 1, 2 and 3 credentialing courses are contained in the left column labeled DAWIA Core Certification. The Capstone course from the earlier version is contained in the Executive & Leadership Support label on the right-hand column. The online forums or Communities of Practice are bundled under the term "Acquisition Community Connection" along with a web-portal named the AT&L Knowledge Sharing System and the virtual holdings of DAU's library. The DAU added conferences and symposiums to the Continuous Learning category to go along with the Continuous Learning Modules. The DAU also further delineated the Performance Support category into consulting, rapid deployment training, and targeted training. The center column marked "Core Plus Development" represents additional training courses or Continuous Learning Modules recommended to career fields, but are not required for credentialing.

Figure 11 The Performance Learning Model as of 2010 (Public Domain)



Source: 2010 DAU Catalog

The construction of the PLM categories can be mapped back to stakeholder frames and perspectives. Performance Support activities consist of efforts to assist individual program offices achieve better acquisition outcomes. The DAU's addition of this duty was a response to the Government Accountability Office report findings discussed earlier. Performance Support engagements vary widely in composition. They can be tailored training provided to existing teams of workers in their workplace. Performance Support can also take the form of consulting with leaders and managers on specific problems or issues challenging an acquisition program. The Defense Systems Management College and the five new DAU Regions were all given the responsibility for executing Performance Support activities. Performance Support activities are now referred to as "Mission Assistance". As with the increase in case-based instruction "Mission Assistance" engagements reshaped the DAU faculty and organization. The DAU

produced and deployed professional development courses to train faculty members to be consultants as well as classroom instructors. The DAU leadership added "Mission Assistance" as an assessed performance perimeter in the faculty's annual performance evaluation system. Eventually, the DAU configured the leadership structure in the regional campuses to include an Associate Dean for Outreach and Mission Assistance (ADOMA) position.

The Continuous Learning Activities are an example of the shift towards what the DAU terms a "customer-centric" approach to learning and expertise development. That is to say, that the students can access them anytime and anywhere they have Internet connectivity. They do not have to come to a classroom to learn. They also satisfied Gansler's desire to increase the use of web-based technologies and provided a means to meet a DAWIA requirement. The Defense Acquisition Workforce Improvement Act requires that acquisition workers complete at least 80 hours of continuing professional education activities every two years.

Once again SCOT helps illuminate the stakeholder perspectives/technological frames that shaped the technological solution to this problem (Bijker, Pinch, and Hughes 1989, 17-50). Gansler and his staff members viewed the continuous education requirement as a vector to inject more web-based technology into the DAU's portfolio. The Directors of Acquisition Career Management were interested in throughput and minimization of workplace disruptions. The DAU had to meet throughput demands and needed a solution that would not overwhelm its physical plant or teaching capacity of its faculty.

The result of the melding of these technological frames was that the DAU developed a series of short self-paced, asynchronously delivered web-based courses. These courses, called Continuous Learning Modules or CLMs, typically take eight hours or less to complete. They are available on a variety of acquisition topics and afford workforce members a means to increase

their knowledge base and work towards fulfilling the 80-hour requirement. The DAU deployed an initial group of 11 Continuous Learning Modules in fiscal year 2001. The CLM afforded workforce members the opportunity to seek out knowledge and access it when needed. Taking a CLM caused minimal disruption to work schedules. Workforce members did not have to wait for classroom offerings. The CLMs can be accessed via the web anytime. The workforce could choose what they wanted/ needed to know (so long as the knowledge could be transferred via text and voice) and learn it on their schedule.

The DAU expanded its information technology infrastructure to support the implementation of the CLMs. The DAU used both government and commercially owned and operated information technology infrastructure to host and support the CLMs. The DAU also relied heavily on contracted commercial expertise to build the online courses. DAU faculty provided the content, but commercial web designers and programmers transformed the content into online courses.

The Communities of Practice are another example of a web-based knowledge transfer technology. While they are not categorized by the DAU as online instruction, they do provide for online learning, and therefore helped satisfy Gansler's goal of increasing the use of web-based technology. Communities of Practice provide online forums for acquisition workers to network, share information, problem solve, and post questions to other members of the online community (DAU CoP Implementation Guide, 2012,1).

The Communities of Practice, like the CLMs, represent a shift in learning approaches towards centering on the student. The Communities of Practice have the effect of moving the location of expertise away from the faculty or "schoolhouse" and moving it towards the workforce itself. The transfer of knowledge takes place without a classroom and between

workforce members and not between faculty and students. Study Participant 014 when discussing the role of Functional Boards in determining "competencies" noted: "Part of the problem with the training model is that it is only one-way. It implies the instructor knows it all. The problem with the model itself is the idea that you can know what people need to know." The comment points to a perceived deficiencies in a top-down definition of expertise and an instructor centric approach to learning. The Communities of Practice provide paths for knowledge transfer other than trainer to trainee.

The idea for online Communities of Practice did not originate with the PLM. The DAU's adoption of the Communities of Practice can be in part attributed to technological momentum. They were an existing technology that shaped the DODs perception of how to accomplish web-based technology transfer (Hughes 1989, 76-79). The online Communities of Practice were an initiative born in the Navy acquisition community, but fell out of favor with a change in Navy leadership (Study Participant 020 2014). The DAU agreed to assume stewardship of the initiative not only because of its potential for knowledge transfer, but also in part because the DAU gained control of the initiative's modest budget: "We took it on because it came with money" (Study Participant 020 2014). The DAU has expanded its online presence since the early 2000s. The Communities of Practice are now included as part of a larger portfolio of online "Knowledge Sharing" tools. As the portfolio of online knowledge dissemination tools grew, the DAU leadership stood up a new organization, the eLearning Technology Center to manage the portfolio. By 2012 DAU's 'Knowledge Sharing" tools included a web-portal with links to a collection of acquisition policy and guidance documents, an expanded set of Communities of Practices, a wiki-like tool called "ACQuipedia", an "Ask-A-Professor" tool that allowed students to ask DAU faculty to research and respond to questions, and finally an online presence for the

Acker Library – DAU's Acquisition Library. Like with the CLMs, the DAU had to expand its information technology infrastructure to operate the Communities of Practice and other Knowledge Sharing tools.

The DAU initially focuses on instituting case-based instruction in courses geared towards senior acquisition leaders. The Capstone courses were some of first make case-based instruction a priority in response to Gansler's study recommendation. The Capstones were developed as executive level post-level III certification courses. The target audiences for these courses were the Program Executive Officers (senior managers responsible for multiple related acquisition programs), the Program Managers for major weapons systems and the senior personnel serving on the staffs of the various Service Acquisition Executives. The courses emphasize leadership, critical thinking, and strategic planning. Some of the courses are considered refresher courses and can trace their roots back to the Executive Refresher Course (ERC) first deployed by the Defense Systems Management School in the early 1970s (Acker 1986, 55). The capstone courses are now termed "Executive & Leadership Support" and are conducted primarily by the Defense Systems Management College.

Other Influences on the Evolution of Learning Technologies

It is impossible to separate the adoption of the corporate university structure and emergence of the PLM from other social dimensions facing the DAU during the late 1990s and early 2000s. In 1998, prior to Anderson assuming the DAU presidency, the DOD Comptroller issued a Program Budget Decision (PBD) that would have cut the DAU budget and staffing numbers to the point that its survival as an agency would be at risk: "This [the PBD] would've been a death sentence for life as we knew it" (Study Participant 003 2013). In addition to the discontent of major stakeholders discussed earlier, the "Revolution in Business Affairs"

championed by the Secretary of Defense was pushing for efficiencies across the enterprise and the DOD Comptroller had begun to question the return on investment provided by the DAU. Several study participants related that the DAU had developed a reputation with some of the DOD leadership as a "country club". The faculty taught roughly 300 hours per year and had the opportunity to pursue individual research interests (Study Participant 002 2013). The Comptroller and some other senior acquisition leaders in the Pentagon viewed this level of workload as too light. One senior DOD official reportedly told Anderson "The last f***g thing you need to worry about here is the quality of life" (Study Participant 007 2013). These perceptions coupled with the DAU's difficulties in keeping curricula current and providing sufficient training opportunities made the DAU a target for budget reductions: "The comptroller was looking for bill payers and we were a big target" (Study Participant 002 2013).

The DAU staff of the late 1990s did little to dispel the DOD comptroller's adverse view of the DAU as an expertise development technology. At some point before issuing the 1998 budget decision memo the DOD comptroller asked the DAU resource manager to explain how the annual DAU budget was developed and managed. The DOD Comptroller found the DAU response to be unsatisfactory. Study participant 002 related that during the exchange between the comptroller and DAU resource manager it was discovered that the DAU resource manager had literally calculated the organization's budget on the back of an envelope. Another study participant related an encounter during the same time period during which he was team-teaching with another DAU faculty member. The other faculty member made comments during class that the study participant believed directly contributed to the DOD Comptroller's decision to issue such a drastic cut to the DAU budget. The faculty team member remarked during to the class that his golf handicap had improved dramatically since joining the DAU staff. Later, while in

the men's room the study participant overheard two students, both of whom worked in the DOD Comptroller's office, comment that the DAU was not exercising good stewardship of taxpayer dollars and would make sure its budget was adjusted accordingly (Study Participant 003 2013). Eventually, the DOD Comptroller's decision memo was successfully appealed through the efforts of DAU faculty who possessed significant expertise in navigating the DOD's resource planning and execution system. However, the incident sent a clear message to Anderson that change and a proven return on investment was required if he was to keep the DAU afloat.

The DAU's transition into a corporate university and deployment of the PLM did more than lay the foundational components of a reconfigured expertise development enterprise… they were an organizational survival strategy. Anderson and the new DAU leadership team used its reconfiguration into a corporate university and PLM initiatives as evidence to the DOD Comptroller and other stakeholders that the DAU was on a technological path leading to a more expert defense acquisition workforce. The DAU leadership team convincingly asserted that under the corporate university structure faculty would teach more often, reach more students, and engage directly with acquisition organizations to provide tailored training. "Frank saved this place a couple of times…not everyone understands that" (Study Participant 003 2013).

More stakeholders than just the comptroller shaped the emergent learning technology architecture. Anderson had a less than collegial relationship with the Functional Leaders and Directors of Acquisition Career Management early in the transformation process. One source of the strain in the relationships came from previous frustrations with the performance of the DAU consortium: "Frank didn't get along with the DACMs at first. The Navy in particular gave him a hard time. We had not kept up with the demand and they were really pressuring him to fix it…DAU's relationship with the FIPTs was quite adversarial" (Study Participant 003 2013). The

Functional Leaders and Directors of Acquisition Career Management had concerns about the DAU's PLM because they viewed Mission Assistance and Knowledge Sharing as distracting from certification training. When discussing the allocation of DAU's resources Study Participant 014 noted that when there was a large deficient in the number of courses available but DAU was expending resources on Mission Assistance they voiced their concerns and were able to influence faculty workload allocation: "We did push back on the number of coursed offered and in that case got the offerings doubled."

Later improvements to stakeholder relationships made technological and organizational changes easier. The SCOT lens pulls the PLM into focus as a technology molded amid the conflicting frames of Functional Boards, Directors of Acquisition Career Management and the DAU. The PLM emerged as means for DAU to ease tensions between the frames and stakeholder groups and ameliorated their long-standing adversarial relationships. In 2003, the DAU re-emerged from this transitional period with improved relationships with the Functional Boards and the Directors of Acquisition Career Management. "Generally speaking we have much better working relationships with the FIPTs and DACMs now" (Study Participant 018 2014).

Over the next 10 years, the categories of "learning assets" under the Performance Learning Model were incubators for a number of new learning technologies. Some of those technologies died in infancy and some grew to maturity. The next chapter describes of some of those technologies and their contributions to expertise development within the acquisition workforce.

Chapter 6

Tacit Potential

Introduction

This chapter explores other contents of the learning enterprise by more fully opening the Performance Learning Model's category boxes. The chapter examines several specific DAU expertise development initiatives between 2003 and 2010. Additionally, the chapter examines the capacity of the initiatives for developing and transferring tacit knowledge. I use criteria formulated from Collins's and Evan's (2007, 14) description of how contributory and interactional expertise is gained and under what conditions as lenses through which to view the technologies. Specifically, I assess the initiatives for their potential to provide: 1) opportunities to practice skills under expert tutelage in a real or simulated work environment, or 2) immersive social environments where actual practices (successful or unsuccessful) are examined, discussed and critiqued Collins and Evans 2007).

Mission Assistance

"Mission Assistance" or "Performance Support" consulting or targeted workshop engagements provide the conditions for both contributory and interactional expertise development. Mission Assistance provides for mentored practice within a worker's actual or simulated operating environment – the type of immersive social interaction associated with tacit knowledge transfer. The instructor teams must reach into their own experiential knowledge base in order to tailor training for specific organizations so that it extends beyond general discussions of policy and process. When discussing this type of expertise building engagement Study Participant 010 said, "We aren't going to send just anybody to do these, we have to find the folks

with the experience and skill set that the customer needs." The concurrent training of actual, working teams of multi-disciplined employees contributes to the exchange of tacit knowledge. Further, the interdisciplinary nature of the events provide for knowledge transfers otherwise impeded by career field and functional area boundaries. For example, during a targeted workshop the engineers responsible for system cost estimates are exposed to the concept of "smoothing a budget curve" by the financial manager. The process involves a previously hidden (at least to the engineers) practice of making adjustments to the cost estimates are made to facilitate the budget approval process. The smoothing process, its rules and heuristics are now shared with the engineers who are now able to construct more informed cost estimates in the future. This type of exchange is more likely to occur in the targeted workshop because it is a more integrated environment than the stove-piped credentialing courses where the participants are often all from a single career field.

The Services Acquisition Workshop (SAW) is a specific example of this type of expertise building, tacit knowledge sharing Mission Assistance engagement. During a Services Acquisition Workshop, DAU faculty train members from a requesting program office on the principles and processes for acquiring services (like helpdesk services versus acquiring a product like a tank). The program team that receives the training typically consists of the program manager and staff members from the various functional departments for example: contracting, logistics, financial management, and engineering. The team, with assistance and guidance of DAU faculty experienced in the task, draft the Performance Work Statements[6] needed for an actual upcoming service acquisition project. Both the instructors and program office staff must reflect on, draw from, and *share* their previous experiences in skillfully performing tasks in this

[6] A Performance Work Statement (PWS) is a document used to describe products and services to be delivered by a vendor to the government and is used in government contracting actions.

form of on-the-job training. "There is a ton of prep work that has to get done to get ready for one of these. They [the customers] are bringing their real-life requirements…we've got to go through their documents and talk to the leaders way before we start the workshop" (Study Participant 008 2013). Program offices that participated in early Services Acquisition Workshops reported satisfaction with their gains in knowledge and experience. One team reported that it believed it avoided an expected contract protest because of the quality of their work statement produced during the workshop. That report was passed along by the DAU President to the faculty during an "All-Hands" meeting as evidence that its Mission Assistance efforts were having a positive impact. The DOD decided to mandate participation in the workshop for services acquisition programs totaling $100 million or more due to the reported success by acquisition teams participating in the workshops and the growing number of services acquisition programs.[7]

Mission Assistance engagements help to maintain the expertise of the DAU faculty as well as developing expertise within the program offices. Because expertise "can be lost if time is spent away from the group" (Collins and Evans 2007, 3). The DAU instructors who regularly re-immerse themselves into an active acquisition work environment may prevent personal expertise loss. "It keeps folks current. They get the chance to see how things are being done today" (Study Participant 010 2013). "It provides an opportunity to get back out there – Re-greening[8] is good thing" (Study Participant 008 2013). These opportunities to refresh expertise contribute to the DAU's capacity to transfer tacit knowledge.

[7] GAO Report 07-20 shows that the DOD increased the amount of services acquired from $84 billion in 1996 to $141 billion in 2005. According to a study funded by the Naval Postgraduate School, DOD spending on service contracts was $198 billion in 2012.

[8] Re-Greening is a term used primarily by the Army community to describe the periodic movement between office and operational assignments to keep tactical skills honed.

The efficacy of Mission Assistance engagements to expertise development is contested. Stakeholder groups advocate Mission Assistance engagements with varying levels of enthusiasm. The Undersecretary of Defense for Acquisition, Technology, and Logistics and his staff are supportive of the DAU's Mission Assistance engagements. Mission Assistance events can directly influence acquisition program outcomes – and improving the performance of acquisition programs is the primary concern of this stakeholder group. The DAU President and senior leadership group are supporters of Mission Assistance. They also value the immediate improvements to acquisition outcomes. As previously discussed in Chapter 5 the Functional Boards, and Directors of Acquisition Management are at times less enthusiastic about the DAU's Mission Assistance efforts. Their mission is to provide a certified workforce to their respective Services and Agencies. They are concerned that Mission Assistance engagements deplete faculty resources needed to teach the DAWIA certification classes. The DAU must balance the faculty workload to satisfy both stakeholder groups. There exists within the DAU faculty a faction that view Mission Assistance engagements as a distraction from the DAU's statutory function of providing DAWIA certification training. "They say - that is not our statutory mission" (Study Participant 008 2013). The DAU leadership discounted that argument and countered that the DAU mission more broadly is to improve the qualifications of the acquisition workforce. Historically, according to the internal DAU metrics "dashboard", the DAU faculty spends between 8% and 10% of their time on Mission Assistance and between 37% and 40% of their time on credentialing/certification courses. Some faculty also charged that the DAU engaged in Mission Assistance primarily to improve its funding situation. "MA [Mission Assistance], what's behind it? Always did it. I did it back in the 90's. No Emphasis – the emphasis was show-up and do a top-notch teaching job…the focus was professional

instruction…after we could charge for it…then is was 'we'll help the shit out them'" (Study Participant 008 2013). The DAU appropriated budget had remained relatively flat between 1997 and 2008 and the DAU was charging DOD acquisition organizations for providing Mission Assistance. "It was a source of dollars…for the longest time the budget was flat…it allowed us to do things" (Study Participant 002 2013). In 2010 the DAU General Counsel reexamined the practice of charging for Mission Assistance engagements and ruled that the DAU's processes were not in compliance with federal statute. This was another compliant by some of the faculty. After the ruling by the General Counsel, the DAU could charge other DOD organizations for its Mission Assistance services in only a limited number of circumstances. A portion of the dissenting faculty predicted the demise of Mission Assistance after this new ruling. "Look, people thought it might go away without the dollar…it just didn't" (Study Participant 008 2013). However, the DAU leadership maintained its emphasis on the efforts and the amount of hours faculty spends on mission assistance has not decreased since the ruling. Additionally, the DAU leadership reengineered the faculty evaluation system so that it included participation in Mission Assistance engagements. There is a perception that Mission Assistance activities are over rewarded in order to drive faculty behavior. "MA [Mission Assistance] seems to be a difference maker in the FCAR [faculty evaluation]" (Study Participant 001 2013). Services Acquisition Workshops and other similar Mission Assistance engagements continue to support expertise development. However, not all Mission Assistance initiatives made it into the learning technology portfolio.

The DAU's bid to deploy an acquisition program office simulator is an example of a learning technology initiative that did not stabilize. The various stakeholders internal and external to the DAU never closed on a solution. One of President Anderson's goals was to

incorporate of computer gaming techniques and simulations into courseware. Around 2007 Anderson tasked two faculty members from the Capital and Northeast Region (CNE) to develop a system that would allow a team of workers from a program office to practice management and decision-making in a simulated acquisition environment. This project, named Conclave, could have provided an immersive social environment and an opportunity for workers to practice skills on a simulator. Study Participant 009 described the desired benefit this way: "[the simulation] Helps with competency by giving teams experience, albeit virtual, before doing the real thing. It would've brought teams together for critical areas where the workforce didn't get enough practice."

The initiative suffered from ambiguous requirements and building the technology presumed users that did not come. The imagined program office customer base had not asked for such a tool. The Regional leadership's attempts to market the tool while still in development met with little success. "When we did the demo, the response from the PMOs [Program Management Offices] was that it wasn't ready for prime-time" (Study Participant 010 2013).

Organizational frictions also worked against closure. The faculty charged with developing Conclave did not include representatives from the other regional campuses in the initial discussions on desired capabilities. This was the source of some of the friction. "South [DAU South Region] weren't fans, expected more" (Study Participant 009 2013). Also, the eLearning center was normally the lead for such projects, but they had only a support role: "We got good support from them [the eLearning center], but there was some resentment that CNE had it and not them" (Study Participant 009 2013).

Ironically, tacit knowledge of the type the simulator was intended to help develop and disseminate, played a role it its demise. The developers contracted by the DAU to produce the

simulation had no experience working in DOD acquisition programs and so lacked the experiential tacit knowledge required to adequately replicate the work environment. “We had to bring in faculty SMEs [subject matter experts] to try and help fix the scenarios…just too late” (Study Participant 010 2013). When Anderson left the DAU in 2010, the project no longer had the support of the DAU headquarters. In 2012, the Dean of the Capital Northeast Region cancelled any further development. He then deployed immature Conclave systems with very limited capability to each of the other regional campuses. The DAU spent approximately $3 million on the effort and no one has ever used Conclave to conduct a Mission Assistance Engagement.

Continuous Learning

The Continuous Learning Modules provide little means to transfer tacit knowledge. There is no interaction with an instructor or with other module enrollees to allow for the transfer of tacit knowledge. The modules do not provide an opportunity to perform work in a simulated or actual environment. They are devoid of an immersive social environment and lack opportunities for practicing activities in an actual work environment and therefore do not meet the conditions needed for tacit knowledge transfer. The modules consist primarily of screens of information that are read by the workforce members at their own pace. There are knowledge checks in the form of quizzes at the end of the module. Module enrollees must answer all quiz questions correctly to complete the module, but they are given as many attempts as needed to meet that standard. Based on information from the 2011 DAU Annual Report, in fiscal year 2002, there were 33 Continuous Learning Modules offered and workforce members completed 2,046 modules. By the end of fiscal year 2010 DAU offered 245 different modules and members of the acquisition workforce completed more than 620,000 of them.

The modules do provide a convenient, inexpensive (to the workforce) way to fulfill the DAWIA mandated continuing education requirements. Workforce members could complete them whenever they had free time without having to travel to a course. Supervisors, and the Directors of Acquisition Career Management also supported them for the same reasons -- they are inexpensive and convenient in that workers are not taken away from their normal duties. The Functional Leaders support the modules because they help bridge knowledge gaps when the leaders wish to add competencies to DAU courses that are too crowded for any additions.

The modules' popularity with other stakeholders has caused some tensions. Particularly, the maintenance of the modules has stressed the DAU faculty. "No one concerned themselves with the upkeep, priority always on the new, not what's already out there" (Study Participant 023 2014). The DAU is now experiencing difficulty keeping all of the modules current with the latest information. "The CLMs [Continuous Learning Modules] are out of control. We can't keep them current" (Study Participant 002 2013). This difficulty ties back to the reported workload allocation conflicts between teaching, conducting mission assistance engagements and all others.

Other continuous learning activities with tactic knowledge transfer potential include the DAU sponsored conferences and symposia. These activities have provided attendees the opportunity to socialize with other acquisition professionals and experts from industry and academia. However, two developments have lessened the opportunities to fully engage in these learning technologies. First, the DOD severely limited attendance at conferences and symposia since the widely publicized misconduct at conferences by employees of the Government Services Agency in 2011 and 2012. Prior to 2011 the DAU sponsored two major acquisition symposia. After the Government Services Agency scandal, the DAU has truncated one symposium and gave up sponsorship of the other entirely. Second, the DAU leadership under Anderson

devalued research as part of its transition to a corporate university structure. “FJA [President Anderson] minimized research” (Study Participant 005 2013). “The faculty workload model associated with the corporate university structure placed greater emphasis on teaching contact hours and Mission Assistance engagements, leaving less time for research. “The faculty lost some time for research…we took their whitespace away” (Study Participant 013 2014). “The Deans pushed back on research because FJA didn’t appreciate it” (Study Participant 005 2013). Additionally, Anderson’s leadership team removed research as a requirement for advancement in the faculty pay plan. Few DAU faculty members research and publish and therefore are most often limited to being participants rather than speakers at conferences. “It amazes me how hard it is to get faculty to submit [papers]” (Study Participant 005 2013). The overall impact is that the DAU hosts fewer conference events and sends fewer of its faculty to symposia and conferences sponsored by other organizations. Finally, budget cuts and sequestration have worked to limit these professional development opportunities for DAU faculty. Beginning in 2012, the DAU leadership moved the authority to authorize faculty attendance at conferences from the department chairs to the regional deans. The overall effect is that fewer opportunities exist for faculty to maintain their expertise and practitioner skills through socializing within professional networks and conducting scholarly research.

Curriculum development activities also fell victim to competing priorities. One senior DAU official concerned with curriculum development efforts has stated that the biggest impediment to timely course development is availability of faculty members to serve as subject matter experts. This comment reflects the impact of increased teaching loads and involvement with Mission Assistance engagements on faculty availability for such efforts. It takes the DAU years sometimes to develop and deploy a new credentialing course. In 2014 the situation was

critical enough that the DAU formed a special internal task force to explore ways of speeding-up the process.

Knowledge Sharing

The Knowledge Sharing area of the PLM is the only one where the DAU leadership explicitly made tacit knowledge capture and transfer a component of its organizational goals. The Knowledge Sharing initiatives represent efforts capture and disseminate the organizationally important tacit knowledge possessed by the workforce. The assumption is that workers will uncover what is otherwise tacit information and then make it explicit by sharing with others using one of DAU's Knowledge Sharing products. The knowledge The DAU published its first "Technology Road Map for eLearning and Performance Support in June of 2001. In that document the DAU leadership and strategic planners said this when discussing the Communities of Practice and other Knowledge Sharing products: "Our knowledge assets will be enriched by turning tacit knowledge explicit and by keeping that knowledge current with shared tools, education, and learning."

The Knowledge Sharing efforts reduce the transaction costs to transfer certain categories of tacit knowledge. The DAU Technology Road Map author's usage of the term "tacit knowledge" most accurately fits what Collins (2010, 91-96) would categorize as "Unrecognized Knowledge", "Mismatched Saliences", or "Logistically Demanding". Unrecognized Knowledge results from workers simply not recognizing that a particular piece of information is crucial to understanding or successful completion of a task. A Mismatched Salience occurs when workers do not pass on crucial information because they assume the others already possess it. Logistically Demanding means it is difficult and resource intensive to communicate and transfer the knowledge (Collins 2010, 95). This last category is especially appropriate because the

knowledge sharing technologies reduce the logistical burden of transferring knowledge across organizational boundaries. For example a time saving technique may be relatively easy to share within an office, or department, but disseminating the knowledge outside the department becomes costly and time-consuming. The Knowledge Sharing technologies enable the workforce to be more widely connected.

The DAU's efforts to connect the workforce for more efficient knowledge transfer altered its technology architecture. Based on information in its Annual Reports, the DAU expanded its portfolio of Knowledge Sharing Products significantly since 2001. The DAU Knowledge Sharing portfolio is divided five product areas: web-portals, online workforce forums for collaboration, lessons learned or best practices repositories, and tutorial videos.

The online workforce collaboration forums or "Communities of Practice" are examples of Knowledge Sharing products that the DAU views as having potential for the transfer of tacit knowledge. "What is going on is taking the tacit knowledge in peoples head and it gets put in some form of content" (Study Participant 020 2014). The DAU has grouped the Communities of Practice under an umbrella called the Acquisition Community Connection (ACC). Acquisition workers can share knowledge previously unrecognized as important by publishing in the appropriate Communities of Practice. Collins contends that interactional expertise is developed through immersive contact with other experts. The Communities of Practice provide forums for experts as well as novices to interact and collaborate. However, the potential of workers to achieve interactional expertise via an online Community of Practice is limited its ability to replicate live social interactions and by the level of expertise possessed by the participants. The DAU does not provide Community of Practice participants the ability to video chat. It is not known whether or not the DAU enabled asynchronous dialogue through message boards or

synchronous communication through chat tools provides the requisite level of social immersion for tacit knowledge transfer. The DAU has not sponsored any studies specifically to measure the transfer of tacit knowledge with the Acquisition Community Connection. The Communities of Practice and the "Ask A Professor" tools do provide one other avenue for sharing otherwise "hidden" knowledge. Study Participant 023 observed that the when questions are posed by workforce members in either of these tools it identifies knowledge gaps and that indicates that subject area is likely not being addressed in the DAU curricula. "I view AAP [Ask-A-Professor] and queries in the CoP [Community of Practice] as indicators of training gaps – stuff that is not covered or not completely covered in the courses, but the workforce needs" (Study Participant 023 2014). Study Participant 023 went on to discuss how he regularly monitored the forum and then made sure that the questions and answers were included in course updates. Through this process he makes "Unrecognized Knowledge" visible to more members of his career field than to just those participating in the online communities. This is likely not a widely practiced activity. When speaking about his colleagues Study Participant 023 said, "I don't know if anyone else does this, maybe Lenny"? This indicates that there may gaps in the knowledge base that remain invisible to a portion of the DAU's faculty and curriculum developers.

The Communities of Practices have evolved through the expertise needs of the workforce. The Communities of Practice originally serviced the individual career fields. However, since 2001 the DAU has added several Special Areas of Interest that function like the Communities of Practice but with a more narrow focus. For example, there is an Earned Value Management Special Area of Interest that draws participants from a number of career-field oriented Communities of Practice. The DAU inherited four communities from the Navy in fiscal year 2002. The project had been a joint Navy-DAU project before the 9/11 attacks. "When the

war hit, money got diverted to warfighting efforts…Navy said over to you DAU" (Study Participant 012 2014). By August of 2014, the DAU had expanded that small group into 57 communities and interest areas. Although the Communities of Practice have steadily increased in terms of topic areas, membership numbers, and contributions they do struggle with keeping the knowledge shared in the forums up to date. "We have a lot of old stuff out there. Some editors are more active than others" (Study Participant 020 2014).

The online forums represent a shift in expertise development from an instructor- student interaction paradigm to one that redefines the workforce as disseminators of knowledge and expertise. The acquisition workforce, rather than the DAU faculty, holds the keys to the future value of the Communities of Practice – the DAU leadership has chosen to discourage faculty from taking on leadership roles in the communities. The leadership felt that the DAU faculty's priorities did not include leading the Communities of Practice. Study Participant 013 shared that when discussing the potential for incentivizing faculty to lead Communities of Practice the DAU President responded "I am not having my teachers doing that. If they want to do that, they can go back to the workforce". Subsequently, the workforce has the primary responsibility for knowledge contributions and sustainment. The height of contribution activity was in fiscal year 2005. During that year there were approximately 14,000 members of the Acquisition Community Connection and they made approximately 92,000 distinct contributions to the knowledge sharing sites (Defense Acquisition University 2012). According to the DAU's 2010 Annual Report, by the end of fiscal 2010 the membership had grown to over 100,000 but the number of contributions did not keep pace with the membership growth. In the aggregate the communities are sustaining themselves. The faculty of the DAU does participate and contribute, but their efforts consume only a small percentage of their duty time. In 2012-2014, according to

its metrics “dashboard” the DAU faculty spends less than 4% of their duty time working on Knowledge Sharing activities of any type. After more than 10 years the acquisition workforce has grown collaborative knowledge sharing communities somewhat reminiscent of the “moral economy” achieved by the Drosophila research community (Kohler 1994, 11). However, the workforce has not sustained all the Knowledge Sharing initiatives put forth by the DAU.

The Best Practices Clearinghouse was an unsuccessful attempt to capture tacit knowledge in the form of lessons learned for successful software development projects. The DAU established a goal to conduct 20 personal interviews with senior, experienced acquisition professionals and include them in a “living history” section of the Best Practices Clearing House. The goal was to extract otherwise tacit experiential knowledge and make it available for distribution. The DAU did meet this goal according to its own annual goals assessment, but ultimately abandoned the Clearinghouse project.

The Clearinghouse is an example of a Knowledge Sharing project that failed due to a lack of sufficient input and support from the acquisition workforce. Staff members working directly for the Undersecretary of Defense for Acquisition, Technology & Logistics launched the project around 2002. However, they did not meet all the project goals and the DAU took over management of the project in 2006. Like the Communities of Practice, the DAU agreed to take over management of the project in part because it came with a budget. “There was jingle involved” (Study Participant 020 2014). This was actually the second attempt the DAU made at establishing a Best Practices repository (Study Participant 001 2013). Both failed in part due to lack of support from the acquisition community at large and because it is difficult to produce a repository of tacit knowledge. The projects depended on acquisition workers to take time to document practices that they believed made their programs successful. “How do you get people

to take time in busy schedules to record this stuff" (Study Participant 001 2013). The repository projects suffered from the "What's in it for me?" syndrome. The DAU did not establish any formal incentive programs and acquisition workers, already shouldering a heavy workload, did not expend the time and energy to contribute. Additionally, because tacit knowledge is context dependent, the few inputs that were received were subjected to intense scrutiny as to the applicability to other programs. "This was always the problem – how do you vet the entries? Who says just because it worked for you that it'll work somewhere else" (Study Participant 003 2013). It was difficult to convert experiential tacit knowledge into generalized, context free form for use by other workers and program offices. "It seems easy to do, but in reality it is very, very difficult" (Study Participant 020 2014). According to unpublished internal documents from the DAU's Knowledge Sharing department, work ceased on the project in 2012.

Training Courses

The DAU, in its new corporate university configuration, continues to use classroom training courses as a primary expertise development technology. Classroom instruction provides a social environment where relevant job experiences may be discussed and shared (along with the associated tacit knowledge) between faculty, students, and guest speakers. Here are three examples of such exchanges. Number 1: An instructor shares with students a practice based on her experiences wherein she augments the textbook formulas used to calculate budgets submissions to account for known withholdings enforced by her command. The practice is undocumented, but one she has found valuable in securing sufficient funds for the acquisition programs she supported. Number 2: A student shares with class members a recent unpublished expectation from members of the Joints Chiefs of Staff that program offices provide written justification for certain types of systems requirements. Number 3: A guest speaker relays

experiential knowledge gained from years of interaction with the defense industry. Specifically he recounts dealings with defense contractors where the contractors make unsubstantiated claims that their prototyping efforts have reduced the technical risk to an acquisition program. He shares with the class lines of questioning that can be used during technical reviews to expose such unsubstantiated or overinflated claims.

Gansler's and Anderson's emphasis on case-based, and technology-based instruction changed the character of expertise development in many of DAU's classrooms. It also hardened boundaries between organizations and instilled a sense of stratification among the faculty members. The DAU leadership initially made the senior level acquisition courses the chief targets for implementing case-based instruction.

The importance that acquisition community leaders and the DAU placed on case-based instruction as an expertise development tool was significant. Edward Hirsch, a long-time acquisition training professional drew on the following quotes from senior DOD acquisition managers as he wrote about the move to increase case-based acquisition training: "The fundamental problem is that government managers have not been trained to deal with situations they encounter in the acquisition process. They need lessons learned – case studies. If you want to institutionalize acquisition reform, you must capture this in case studies; You don't pass on lessons learned by writing a report or a book of lessons learned and having people read it. You need simulations or case discussions so people can talk about situations, ask questions, test their ideas, and learn about the alternatives available and what does and doesn't work" (Hirsch 1999, 32).

Simultaneous with the infusion of case-based instruction the DAU leadership took the opportunity to completely revamp the credentialing requirements for the program management

career field. The DAU, with the concurrence of the Functional Leader and Directors of Acquisition Career Management, reengineered the Advanced Program Management Course into two courses.

The first course, designated PMT352, serves as the DAWIA level III certification course for the program management career field. It is designed as a hybrid distance-learning / classroom course. Students are allotted 60 days to complete the online computer-based instruction portion of the course. After completing the online portion, students attend the six-week classroom portion. During the classroom portion, students work as teams to solve a series of management problems faced by a fictional acquisition program. The concept is very similar to the "System X" management simulation that had been used by the Defense Systems Management School. The DAU regional campuses teach PMT352.

The second course, designated ACQ401, is a "post-certification" executive course. It satisfies the statutory requirement for program managers assigned to major weapons programs to attend specialized program management training. It is a 10-week long in-resident classroom course. The curriculum is comprised primarily of Harvard Business School type case-based instruction. "There are 90 case studies in 401" (Study Participant 015 2014). The Defense Systems Management College manages the ACQ401 course. The teaching cadre for ACQ401is made up almost exclusively of faculty assigned to the Defense Systems Management College.

The restructuring of the program management curricula was a source of conflict between Anderson and the long-term faculty. The Advanced Program Management Course had been 14 weeks in duration and many of the long-term faculty questioned whether 10 weeks was sufficient time to train program management executives. Additionally, some faculty resisted because the new case-based curriculum eliminated the multi-disciplinary team teaching approach that had

been used in the Advanced Program Management Course – an approach they felt had been proven as effective. “The APMC always had a mix of people [meaning faculty from different disciplines]…not so anymore. The discussions were much richer then” (Study Participant 013 2014). Faculty teams comprised of functional experts from Regions and the Defense Systems Management College taught the Advanced Program Management Course (designated PMT401). Only faculty assigned to the Defense System Management College taught PMT401. The Systems Management College faculty members are primarily program management experts. The loss of the multi-functional teaching teams meant that when students analyzed cases with problems associated with functions from a career field other than program management, they might not have access to the most expert faculty in that area. For example, faculty members facilitating a case study laden with systems engineering issues would not necessarily be systems engineers by trade.

Course structure is linked to the social and organizational dynamics within the DAU. Without the requirement to teach in a cross-functional environment, the regional faculty members found themselves teaching only within their departmental functional areas. They became stove-piped in teaching only their career-field certification courses. This situation provided instructors with much fewer opportunities to interact and collaborate with experts outside of their career fields. Several study participants during their interviews lamented the loss of contact with valued colleagues, and the diminished number of opportunities to broaden their knowledge and experience. The new operating procedure decreased the prospects for faculty members to gain or maintain interactional expertise in areas outside their primary acquisition career fields. “The biggest problem we have now that we didn’t have in those days is integration - integration across the silos. But what you have now is – and this is the result of how DAWIA

was implemented – is that you have tremendous training within a community. For example if you were a CON guy [member of the contracting career field] and you were doing this in a college you'd have a minor in contracting 'cause that's how many courses you have—All CON courses. The only other acquisition stuff they get is ACQ101 [an online, entry-level course on basic defense acquisition concepts]" (Study Participant 002 2013). "Stove-pipes killed interdisciplinary teaching teams. We've lost the interdisciplinary aspect of almost all our courses" (Study Participant 015 2014).

The decision to dismantle the Advanced Program Management Course also solidified the boundary between the long-standing Defense Systems Management College and the newly established Regional Campuses**.** The Defense Systems Management College trained only executives and senior acquisition leaders. The Regional Campuses trains the much larger non-executive portion of the workforce. "They [DSMC] didn't want to do what the other campuses were doing…it was beneath them. We have two DAUs right now even" (Study Participant 013 2014). This led to some amount of animosity developing between the Defense Systems Management College faculty and the faculty assigned to the Regional Campuses. "They [DSMC] are just so arrogant and condescending…they think they are the only ones who can train executives" (Study Participant 010 2014).

Throughput requirements shaped the courses and faculty workload expectations. In response to complaints from the Directors of Acquisition Career Management and other stakeholders, the DAU leadership decided that it needed to increase the throughput of its credentialing/certification training. To meet this need, Anderson and his leadership team emphasized increasing the number of teaching hours assigned to faculty members and shortening the length of classroom courses where possible.

The newly consolidated DAU faculty had assumed the faculty workload model used by the Defense Systems Management College. In that workload model the faculty taught approximately 300 hours per year and planned for up to four hours of preparation time for every hour of instruction. Anderson challenged the faculty on that cultural norm and used a new time accounting system installed by the Chief Financial Officer to determine if the 4 to 1 ratio was accurate. The data from the time accounting system indicated the ratio was much lower. "4 to1 was our mantra, but the accounting system proved us wrong" (Study Participant 002 2013). Anderson then directed that the faculty strive to reduce the ratio to one-half hour of prep or less for each hour of teaching. Over time, that "efficiency" metric was achieved. However, some instructors contend that the amount of prep time in actuality remains higher and that faculty simply reports less preparation time because high amounts of preparation are viewed unfavorably during annual performance evaluations. Whatever the true preparation to teaching ratio might be, the significant effect of the lower reporting is that faculty in the Regions are now expected to teach at least 640 hours per year. This new production goal essentially doubled the number of courses that could be offered by the DAU.

To further increase throughput, Anderson and his leadership team sought to shorten the time students spend in the classroom by one of two means. The DAU either compressed the schedules or used web-based instruction to decrease the duration of classroom courses.

Compressing course schedules presents challenges results in less social immersion and therefore less opportunity for tacit knowledge transfer. The DAU curriculum managers sometimes add pre-course assignments or homework in order to cover all the competency areas required by the Functional Leaders in the shortened courses. This solution increases the intensity of coursework for both the faculty and the students. Faculty sometimes find themselves teaching

a classroom offering while guiding other students through pre-course work for the next offering. Students find pre-course assignments and homework particularly problematic when their organizations do not allow pre-course assignments to be completed during normal duty hours. Many organizations refuse to authorize overtime for their student employees. Students often view time in class as work, and so argue that they are working beyond their normal duty day parameters without compensation. This situation puts pressure on curriculum managers to keep instruction confined within a normal eight-hour workday. This often results in curtailment of socially immersive activities such as facilitated discussions and practical exercises. One Study Participant referred to this phenomenon as "drive-by" teaching of learning objectives. Study Participant 001 remarked, "We sometimes end up teaching in sound bites".

Changing social norms also influence course length and class hours. The rise of dual-income families has made an impact. Traveling away from family for weeks at time for a credentialing course puts pressure on working couples with children. Long class hours causes conflicts with childcare and afterschool activities. "I will tell you, one of the demographics of the workforce…back in the 80s early 90s I was in a classroom with 122 students, 119 were male, 118 were white. In a 36 student section you had two females…watch what happens now when there is a snow event…whole lotta frustration for both instructors and students" (Study Participant 002 2013). The comment is a direct reference to working couples scrambling to find ways to juggle family and credentialing course schedules.

The DAU leadership also sought to make hours spent in the classroom more effective for transferring knowledge and developing expertise. Beginning in the early 2000s the DAU began to institute practical exercises, simulations, and other participatory learning activities other than lecture-based instruction. These techniques are perceived to possess more potential for

discovering and disseminating knowledge than does purely lecture-based courseware. “Doing is better than listening for retention” (Study Participant 013 2014). Properly executed, group practical exercises and simulations allow students to practice skills and complete tasks while discussing the outcomes with fellow students and instructors. The DAU has incorporated these types of participatory learning technologies in increasing numbers. They are now common components of credentialing courses.

The DAU leadership and faculty believe that the effectiveness of these more participatory learning activities hinges in part on establishing a non-attribution environment in the classroom. Non-attribution is considered so important that the leadership published a formal policy non-attribution policy for all of its courses (DAU Directive 704). The policy is announced at the beginning of every classroom course. The DAU has also posted signs in classrooms that remind students and faculty: “This is a Non-Attribution Environment”. The policy is intended to afford students, instructors and guest speakers a learning environment where they can speak openly about their acquisition programs and organization’s successful and failed efforts without fear of having their comments attributed back to them. Faculty members frequently comment that they perceive a decrease in the quality of classroom discussion when students are primarily from a single organization. They then cite fear of attribution as a primary cause. At least one manager of Level III credentialing course has resisted video taping his guest speakers. The course manager fears that the speakers will less forthcoming because they are concerned that recording would make enforcing the non-attribution policy more difficult.

The DAU leadership also attempted to inject other less pedagogically oriented technologies into the classroom to increase learning effectiveness. For example, Anderson and his chief technology advisor backed an advanced triple screen visual display system for use in

the classroom. The DAU leadership invested in the technology with the expectation that the triple screen presentations would increase the students' levels of information retention and rates of information processing.

The 3-screen technology was short-lived at the DAU for three primary reasons. First, The DAU faculty as a whole never truly embraced the technology despite it being equipped in at least one classroom at each of the Regional Campuses. "I can think of one colossal flop – Trizenter. Hey, neat technology…but what does it really buy you?" (Study Participant 015 2014). Using the technology required the curriculum managers to produce separate, specialized versions of courseware presentations. Faculty then had to become familiar with two versions of a single lesson plan. This increased the workload of the faculty for unproven benefits. Additionally, the huge screens rendered much of the whiteboard space in the classrooms unusable. When curriculum managers failed to keep the three-screen versions of the courseware current the result was a "normal" single screen of information, but the instructors had less whiteboard space.

Second, the DAU's efforts to assess the actual derived benefits of employing the technology were inconclusive at best. Student surveys, test scores, and instructor observations provided no confirmation of the vendor's advertised benefits to learning. "Some of the reviews we were getting was that this is nice but it wasn't a breakthrough for the students" (Study Participant 012 2014).

Lastly, the equipment was difficult and expensive to maintain. The DAU information technology staff in particular found keeping the system operating problematic because of interoperability issues between the DAU network and the display system's control software. "The warranties all expired, the service level agreements were expensive…the vendor didn't

keep up with Microsoft's updates" (Study Participant 011 2013). By 2011, all but one of the three-screen display systems had been removed from the DAU classrooms.

The experiences associated with this technology prompted the DAU leadership to rethink the way the organization approached technology insertion. They established a "technology council" to manage technology insertion. The technology council membership includes faculty members, curriculum developers, audio-visual technicians, information technology specialists, business unit representatives, the DAU Chief of Staff, and the Chief Financial Officer. This construct provided a formal forum for these internal DAU stakeholders to advocate their technological frames and negotiate closure. Students are not represented in this forum. The DAU typically seeks input from students through surveys at the end of pilot projects.

The DAU instituted new technology that broke the bounds of the traditional brick and mortar classroom delivery. Anderson and his leadership team embarked on a campaign to convert credentialing/certification level I and level II classroom courses into web-based, distance-learning formats. The DAU leadership's push for distance-learning came in part from the need to increase student throughput. "Frank [President Anderson] and others saw distance-learning as a way of increasing throughput at relatively low cost" (Study Participant 003 2013). The DAU's Annual Report from 2000 states: "The challenge to train a 140,000-member [9] AT&L Workforce community is no small task. To meet demand, DAU had to break the traditional limitations of the "resident course" mold—everyone must be educated in a classroom."

The DAU leadership's decision to make distance-learning a major component of expertise development created considerable tension within the enterprise. The majority of the faculty knew very little about distance-learning technologies. A portion of the faculty members

[9] The size of the acquisition workforce has fluctuated considerably after the initial identification of 240,000 in the early 1990s.

resisted the distance-learning initiatives. “We had a lot of faculty resistance” (Study Participant 004 2013). “There was a lot of opposition to distance-learning here” (Study Participant 003 2013). “We had 545 faculty and staff and about a half dozen were in favor of DL [distance-learning]” (Study Participant 004). As with the restructuring of the program management courses that decreased the amount of classroom contact hours, the faculty opposition protested that instructional quality would suffer. “They were traditional classroom instructors--sage on the stage-- and thought you we never going to be able to replace that social interaction” (Study Participant 004 2013). The opposition group held firm to the belief that the social interaction in the classroom is key to effective learning. “Classroom is the only way to teach and nothing else works…that was the basic argument” (Study Participant 004 2013). This group had slowed preliminary initiatives to implement distance-learning technologies that began prior to Anderson becoming president. The new DAU leadership under Anderson countered the opposition by citing scores of distance-learning studies attesting to the technology’s effectiveness (Study Participant 004 2013). Importantly, Anderson and this leadership team also hired new faculty with specific distance-learning expertise to establish and staff a new web-based learning organization – the eLearning Technology Center. The eLearning organization oversaw the build-out of distance learning courses and the associated information technology infrastructure. The eLearning group actively advocated distance-learning. In addition to pointing to the sizable collection of research referenced in their plans, the eLearning group argued that the opposition’s protests were rooted in personal interests rather creditable evidence of detrimental quality impacts. Study Participant 004 indicated the faculty resisted because they would no longer be center of attention in the classroom and would lose control of the course content. “They are all worried about their lesson plans…that’s my material -- my lessons and now they [students] are

just going to click-through it". The senior DAU leadership and their eLearning Group allies overcame the argument from the opposition faculty that instructional quality would suffer in distance-learning courses using data from the numerous studies cited in the technology plans. This occurred despite the observations of at least one senior curriculum developer. He noted that originally the DAU was using the University of Phoenix as a model. The University of Phoenix's model was synchronous delivery. Therefore the majority of research cited by the distance-learning champions was focused on synchronous distance-learning technologies. However, the DAU was exclusively implementing asynchronous technologies. "The Phoenix guys showed Frank [President Anderson] that their model actually reduced throughput…instructors could only manage small classes, not 30 or 36 like we are used to…so that is how we ended up with the asynchronous route" (Study Participant 003 2013).

Support from the Directors of Acquisition Career Management and congressional appropriations also influenced the DAU's distance-learning initiatives. "In general anything that reduces time away from the workplace and reduces travel costs the DACMs are onboard with…not always but 99% time" (Study Participant 018 2014). "About that time Senator Byrd[10] got ahold of the DAU budget and cut it $9M. He gave it back with the stipulation that it be spent within 20 miles of Uniontown, Pennsylvania. So we got mixed-up with contractors there. Some did a good job, other didn't. None of them knew anything about distance-learning -- so they learned. That was part of it. It was an economic development plan for that part of Pennsylvania" (Study Participant 003 2013).

[10] Study Participant 023 remembers Pennsylvania Congressman John Murtha, not Senator Byrd as the politician involved. That version is more likely correct given Byrd represented West Virginia.

In the end, the DAU matured a sizable distance-learning portfolio and in fiscal 2002 the DAU graduated more students from distance-learning courses than from classroom courses. In fiscal year 2010 the DAU graduated more than four times as many students from its almost exclusively asynchronous distance-learning courses than classroom courses according to its 2010 Annual Report.

The asynchronous distance-learning courses are less suited for the transfer of tacit knowledge than instructor facilitated classroom instruction. When comparing the DAU's online and classroom course for tacit knowledge transfer Study Participant 013 had this to say: "For the learning that we can measure there is not much difference…but for the tacit learning stuff – the classroom is all over that." Study Participant 002 made this observation: "Job impact and relevancy scores on student surveys are always lower for the DL [distance-learning] courses. If I want to raise the scores…and I've seen this where we have put a DL course back into the classroom…if you want to raise the job impact scores you add back in the instructor." The job impact and relevancy questions on end of course surveys are intended to measure how helpful a course is in improving a student's job performance and how much of the course content relates directly to students job duties. Furthermore, I have reviewed comments from scores of end-of-course student surveys. In all cases multiple students indicate that among the most beneficial aspects of the courses are the experiences of the instructors and their fellow students. My interpretation of these observations is that more knowledge – specifically the tacit knowledge needed in order to perform jobs well is passed more readily in socially immersive classrooms than through asynchronous distance-learning events as implemented by the DAU.

As an expertise development technology, the vast majority of the distance-learning courses most resemble the Continuous Learning Modules described earlier – They provide zero

social interaction. However, the distance-learning courses are considerably longer and cover larger amounts of material than do the modules (students are normally allowed a minimum of 60 calendar days to complete). Like the modules, there is no interaction with other students taking the courses. There is little, or no student contact with the instructors monitoring the course except when students challenge a test question. Material is presented in a series of slides/screens. Some courses incorporate audio where the slide content is read to the students. The vast majority of the learning assessments are executed through online lesson quizzes made up of true-false, matching and multiple-choice questions. Unlike the modules where students are given unlimited attempts to answer 100% of the questions correctly, students taking distance-learning course quizzes are limited to three attempts.

The three-attempt policy along with instructor observations provides evidence that distance-learning courses as implemented by the DAU are less effective than classroom courses at knowledge transfer. The three-attempt rule was put into place in 2009 for two primary reasons. First, prior to 2009 the instructors monitoring the progress of distance-learning students had no definitive, corporate-wide guidance on how to handle quiz failures. Some allowed unlimited test resets and attempts, some less. Instructors interacted with students to assess learning and made judgment calls as to whether or not students should move forward to the next lesson block. This process slowed down throughput. The secondary reason was that records of student behavior on the course showed that a significant number simply paged through the material as quickly as possible and then took the quizzes. The students expected to have the exams reset multiple times. The student behavior metrics seemed to indicate that many online course takers were not reading for comprehension. The DAU leadership decided to institute a

three-attempt limit at passing any lesson quiz to encourage serious study of the lesson material. The policy had the added benefit of increasing throughput.

A portion of the faculty also perceives that students retain material from distance learning course at unacceptably low rates. They commonly complain that students attending classroom courses do not have the knowledge base required to fully participate in exercises and discussions. It is common for a level II certification course to have one or two distance-learning courses as pre-requisites. Instructors complain of the need to remediate students on subjects that should have been mastered in the distance-learning pre-requisites. "The problem with DL [distance-learning]…the topics don't stick" (Study Participant 015 2014). The faculty members point to the known problem of students "clicking" through distance learning courses and the time lag between when a student completes the online courses and attending the following classroom course as sources of the knowledge deficient. "Look we've got the stats, students speed click through the material to get to the exams…then they don't retain it" (Study Participant 008).

Student work schedules and ease of course scheduling and registration also influenced the relationship between distance-learning and classroom courses. The scheduling section of the DAU and the Directors of Acquisition Career Management exacerbated the time lag issue. In the early days of implementing distance-learning courses the DAU deployed many courses as "hybrids". That is, courses previously taught entirely in the classroom were split into distance-learning and classroom components. Originally, when students enrolled in a hybrid course they were placed in a classroom section scheduled to start quickly after a 60-day deadline for completing the online portion. Over time, both the DAU schedulers and the Directors of Acquisition Career Management found it difficult to reschedule students who failed to complete the online portion in time. "Student's weren't finishing the A portion [online course] in time to

make their classroom dates. Is hard to find last minute fills. Seats were going empty" (Study Participant 018 2014). Students missing the online course deadline caused seats in classrooms to go unfilled. The DAU Chief Financial Officer and the schedulers who worked for him viewed this situation as inefficient as well time-consuming. The career managers were concerned that problem caused lowered their credentialing/certification rates. Over the protests of faculty, the online and classroom portions of the courses were decoupled. Once the course sections were decoupled students could take the online portion and then not attend class for 12 months or more. The result was an increased number of students attending the classroom portions of hybrid courses without the expected level of requisite acquisition knowledge.

Stabilization Achieved?

The evolution of the DOD's acquisition expertise development enterprise from 1999 to 2010 resulted in technology choices that in some cases enhanced, but in other instances diminished opportunities for transferring tacit knowledge and developing and specialized tacit expertise. The increased use of case-based instruction, simulations and group practical exercises in the classroom provided immersive social environments favorable to tacit knowledge transfer. Mission Assistance engagements in the workplace or a simulated workplace environment provide similar favorable conditions from which to gain specialized tacit expertise. The Acquisition Community Connection and other online knowledge sharing tools replicate, at least in part, the social environments needed to disseminate tacit knowledge. However, the asynchronous distance-learning courses and Continuous Learning Modules, while suitable for the global broadcast of entry-level explicit knowledge, are mechanisms not well suited for tacit knowledge transfer.

The stove-piped nature of the learning enterprise reduces opportunities for students and faculty to gain or maintain cross-disciplinary interactional expertise through its technology portfolio. The acquisition community values the multi-disciplinary team approach to acquisition activities yet opportunities to train in that environment. "The defense integrated product team (IPT) concept was adapted from commercial business to streamline an antiquated, inefficient, stove-piped process. IPTs are composed of stakeholders representing all appropriate functional disciplines, working together to build successful programs, thereby enabling decision makers to make the right decisions at the right time" (Brown 2010, 30-32). Some courses like PMT352 [level III credentialing course for the program management career field] and ENG301 [level III credentialing course for the engineering career field] do simulate this concept by grouping students into teams and assigning specific functional roles during practical exercises. However, it is still a group of program managers or engineers role-playing as contracting officers, budget analysts, and logisticians without the benefit of participating with actual practitioners from other career fields. An old Army maxim is "train like you fight" – the current expertise development technologies support that ideal only in a few cases.

The DAU continues to operate under corporate university model. The general regionalized structure instituted by Anderson and his leadership remains. However, after Anderson ended his tenure as the DAU President in 2010, the emphasis on using the Performance Learning Model as a marketing tool and guide for learning technology investment waned. "You won't find the PLM in annual reports anymore" (Study Participant 012 2014).

Subsequent DAU Presidents have not fully embraced the learning model and have sought different approaches developing expertise. The Honorable Katrina McFarland who currently serves as the Assistant Secretary of Defense for Acquisition held the position of DAU President

briefly after Anderson's departure. She viewed credentialing/certification training as being a necessary, but insufficient mechanism for achieving an acceptable level of expertise in the workforce. She successfully proselytized this view to other senior leaders in defense acquisition community setting the stage for another period of destabilization for the DAU.

Chapter 7

The Future of Acquiring Expertise

Introduction

This chapter explores the DOD's increased emphasis on expertise development in the workplace post 2013. The chapter describes the DAU's successor to its Performance Learning Model – The Acquisition Learning Model. It examines changes in the learning technologies associated with the new learning construct through the lenses of tacit knowledge and SCOT. Finally, it summarizes my observations stemming from this study and identifies areas for further research.

The DOD Still Views Expertise As A Path To Acquisition Success

The DOD acquisition community leadership remains committed to the "linear model of acquisition success" as its overarching technological frame. Like his predecessors the current chief of DOD acquisition, Frank Kendall, believes that the quality (professionalism) of the acquisition affects the outcomes of defense acquisition programs: "People matter. If there is one legacy I would like to leave behind it is a stronger and more professional Defense Acquisition Workforce than the one I inherited from my predecessors" This quote, taken from a 2014 article in AT&L Magazine, illustrates the obdurate nature of the "linear model of acquisition success" introduced in Chapter 3 and shown again below in Figure 12.

Persistent acquisition problems keep the opinions of how best to instill expertise churning. As a result the learning technologies are in an almost continuous evolutionary state. A DOD study published in 2014 indicates that 32% of all major defense acquisition programs between 1997 and 2013 have experienced a significant or critical breach. Significant breaches

occur when costs grow more than 15% over the baseline. Critical breaches occur when costs grown more than 25% over the baseline. According to a DOD report entitled *2014 Annual Report: Performance of the Defense Acquisition System*, There have been 90 breaches since 1997. 43 of the breaches occurred since 2005. The DOD remains unsatisfied with the output (successful acquisition outcomes) of the linear model of acquisition success and continues to seek ways to improve the input (quality acquisition workforce) to the model.

Figure 12 The Linear Model of Acquisition Success

Quality Acquisition Workforce → Better Decisions → Improved Defense Technology Acquisitions

The Most Appropriate Technology To Build Expertise Is Still Contested

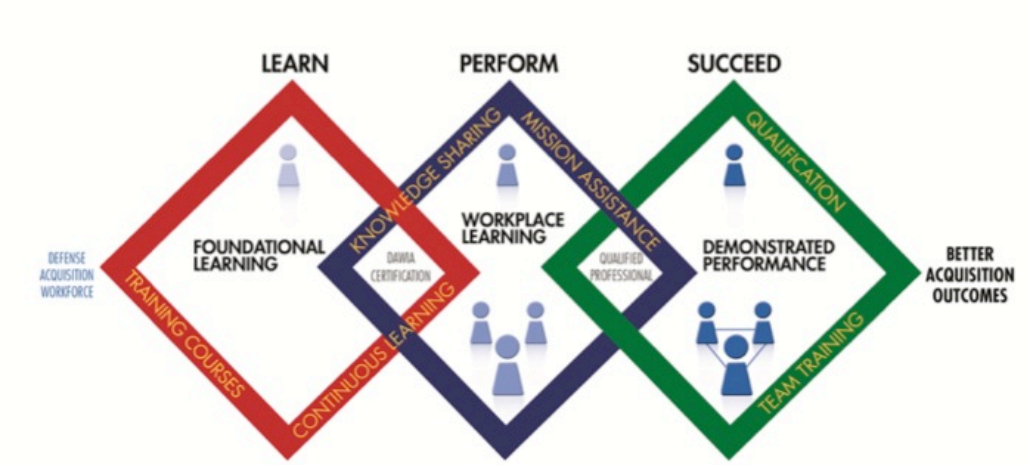
New technological frames have taken root in with the DOD acquisition community leadership that are shaping future choices in DAU's learning technologies. During the Anderson era a technological frame that privileged web-based instructional technology as an acquisition expertise building solution emerged. Between 2012-2014 a new frame emerged with the acquisition leadership that elevates learning in the workplace and team/group training as a preferred solution for acquisition expertise building.

In response to this first frame shift, the DAU in late 2012 revised its model for developing expertise in a way that could dramatically alter the technology of learning. The DAU Leadership dubbed the new model the "Acquisition Learning Model" or ALM. The DAU strategic planners constructed the Acquisition Learning Model to graphically depict changes in DAU's technology trajectory. The goal of the ALM remains the same as the goal of PLM -- to improve acquisition outcomes. What has changed are the primary location of expertise

development and a subtle shift in how the expertise is viewed. In the previous version of the learning model the training courses were the depicted symbolically as pillars holding up the house of knowledge. Knowledge Sharing, Mission Assistance, and Continuous Learning were supporting and complementary services to the certification courses and post-credentialing/certification executive courses. The new model, shown below in Figure 13, depicts the training courses as foundational pre-requisites for the development of expertise. However, in this new model expertise building in the workplace is given primacy. Workers develop expertise as they perform their duties. Mission assistance engagements and knowledge-sharing tools simultaneously assist workers in performing their tasks and building their expertise. The final phase in the sequence is proving their individual and collective organizational expertise by demonstrating skilled practice as part their normal duties. Their expertise is then documented as part of an emerging, and not yet fully defined qualification process (Study Participant 024 2014). I will discuss this emerging qualification process in greater detail later in this chapter.

This new model remains based on the "linear model of acquisition success" frame. The model depicts the acquisition workforce members as inputs to a processes with three interlocking phases that results in better acquisition outcomes. The activities depicted in both the "Perform" and "Succeed" stages of the model occur in the workplace.

Figure 13 The Acquisition Performance Learning Model (Public Domain)



The interlocked sections of the graphic are significant because they hint at the DAU's intention to continue to move expand expertise development outside the classroom. The intent appears to be a more complete melding together of training and workplace experience -- a movement that began with the PLM and reorganization into a corporate university. The Acquisition Learning Model reflects the idea that classroom training lays the groundwork or "foundation" for developing expertise in the workplace. This represents the basic knowledge of the acquisition and career field processes and activities described by study participants in Chapter 1. The intersection of the "learning" and "performing" areas points to a potential for classroom activities to go beyond transferring the "foundational" knowledge to contributing to tacit expertise development.

The ALM also captures, perhaps unwittingly, the collective, social nature of tacit expertise. The people icons contained in the diamonds show a movement from individual training to actual work or training in small groups and then on to larger group or even cross-organizational work. That is the "Team Training" indicated on the green "Succeed" diamond. "It's the military model. Everyone went to their school…your MOS [Military Occupational

Specialty]…you learned your specific tasks. But they don't stop there. They do organizational training…where they go out and actually do stuff. That's what the SAWs [Services Acquisition Workshops – discussed in previous chapter] are" (Study Participant 012 2014).

This view is similar to Collins description of "bicycle balancing" versus "bicycle riding" and illuminates the import of socially held tacit knowledge. Collins noted that the tacit knowledge to balance a bicycle is somatic, but the tacit knowledge required to ride a bike is collective to the society (Collins 2010, 5). For example, how close to riders ride? Which paths and streets are safe? This analogy can be further extended. Imagine that each of the acquisition career fields is represented by a different mode of transportation. The program managers are bicyclists. The systems engineers are car drivers. The contracting officers are bus drivers. The testers are trolley drivers. The logisticians are pedestrians. The rules and regulations of acquisition policy represent the roads, traffic lights and rails that make up the transportation environment. Each group has individual skills for negotiating traffic safely. They are able to avoid accidents and enable the operation of others within the system. The tacit knowledge associated with that is held collectively within the social group and is gained through experiences in the group.

Experiential, Tacit Knowledge Rising?

My interpretation of this new model is that the ALM indicates a budding recognition within the acquisition community and DAU leadership that an effective way to gain the expertise needed for acquisition success is through experiential learning in socially immersive environments. Further, I believe the DAU is adjusting its technology to that emerging frame. The new frame echoes the perspectives of Collins. Namely, that the tacit expertise needed to have successful acquisition outcomes is collectively held within the specific societies of the

acquisition workplaces and is only acquired by being embedded in those societies (Collins 2010, 3-6).

The DAU has directed changes in mission priorities and initiated technology developments to further operationalize the Acquisition Learning Model. The DAU leadership has elevated its attention on Mission Assistance, Knowledge Sharing, and an entirely new workplace training technology.

To the Workplace! - Mission Assistance Moves Up the Charts

The DAU is placing even more emphasis on activities geared toward that developing specialist tacit knowledge that fuels contributory expertise. The DAU strategic planners have placed Mission Assistance in the center stage "Perform" or "Work Place Learning" area of the new three-phased process. This placement is in keeping with the direction propagated by the Acting President of the DAU, Dr. James McMichael, in December 2013. In it he emphasized a more prominent future role for Mission Assistant engagements in developing workforce expertise. McMichael stated in a memorandum addressed to all the DAU Regional Deans and Directors of business units entitled "FY2014 Mission Assistance – Strategic Refocus":
"As the demographics and needs of the Defense Acquisition Workforce shift, a requisite shift in Defense Acquisition University's (DAU) strategic focus for providing MA [Mission Assistance] is needed." In other words, the DAU should do more in the workplace to assist acquisition supervisors in developing contributory expertise in their employees.

More Mission Assistance means potential conflicts in allocating resources. McMichael then went on to direct the Deans and Directors to conduct more a more intense and targeted marketing campaign with the acquisition organizations within their respective Areas of Responsibility (AOR). He also directs the rebalancing of DAU resources if needed to meet

Mission Assistance customer needs. Rebalancing of resources means taking more faculty time to execute Mission Assistance engagements and would likely result in reduced teaching, knowledge sharing, and curriculum development efforts.

Finally, in the memo McMichael instructs the Deans and Directors to enforce the capture and sharing of knowledge gained during the conduct of Mission Assistant engagements. This is an important command in the context of tacit knowledge transfer. In the past such knowledge and gained expertise would have remained unknown to all but those participating in that particular Mission Assistance event.

Trainers or Stewards of Acquisition Knowledge?

Knowledge Sharing shares the center stage with Mission Assistance in the new Acquisition Learning Model. The DAU Knowledge Management Strategy published in 2011 claims that the Knowledge Sharing activities as vital knowledge transfer paths connecting the workforce members and organizations to each other. It further states that the DAU Knowledge Sharing activities are designed to connect experts across the DOD, and to capture and share knowledge across organizational and information technology infrastructure boundaries.

The new emphasis on Knowledge Sharing and Mission Assistance spawned organizational changes within the DAU. A new organization – Mission Assistance and Knowledge Repository (MAKR) was established in 2013. The organization is charged with coordinating the Mission Assistance and Knowledge Sharing activities across the entire DAU enterprise. Even with a new organizational structure there are cultural influences that are potential obstacles to the success of Knowledge Sharing initiatives. “Knowledge Sharing is the Rodney Dangerfield of the institution – it gets no respect…and I have the stats to prove it…Not from the faculty, not from the leadership…nobody around here disputes its importance. I think it

just suffers from anemia in the sense that teaching is a person-to-person kind of social learning thing, Mission Assistance is a person-to-person learning meaning thing, but Knowledge Sharing is this…content thing " (Study Participant 020 2014).

Cultural issues notwithstanding, the fusing of Mission Assistance and Knowledge Sharing has begun. In an internal DAU directive, the Director of MAKR mandated that Mission Assistance team leaders conduct formal post engagement interviews with customers. The goal of the interviews is to capture experiential tacit knowledge in the form of lessons learned and proven practices for dissemination via the DAU's Knowledge Sharing technologies. The interviews are the implementation tools for McMichael's direction to capture knowledge gained from Mission Assistance.

The DAU has decided to invest in the expansion of Knowledge Sharing infrastructure. At Dr. McMichael's direction, the DAU re-instituted the Best Practices Clearing House – renamed the Proven Practices and Lessons Learned (P2L2) Repository. This is in keeping with the renewed emphasis on sharing tacit knowledge gained during Mission Assistance engagements. Additionally, the DAU's 2011 Knowledge Management Strategy calls for expanding access to knowledge content using mobile devices, increasing the amount of video content in a You Tube type format, and providing more online tools developed to provide knowledge to aid performance of specific tasks.

The DAU leadership is currently contemplating an even greater role in the management of DOD's acquisition knowledge base. During the 2014 DAU Senior Managers Conference, the attendees were asked to react to the question: "Is DAU the trainer of acquisition professionals or the steward of acquisition knowledge?" The answer constructed by the conference attendees is that the DAU should be both. A subgroup of attendees was further tasked with developing

strategic goals, tasks and measures to support DAU's position as both trainer and steward. As of January 2015, the DAU leadership had not yet publicly addressed any expansion of knowledge management responsibilities or what exactly is meant by "stewardship".

In addition to expanding its Mission Assistance activities and re-establishing its Best Practices database the senior acquisition community leaders and the DAU leadership are adding another entirely different approach to expertise development.

Credentialing/Certification Just Isn't Enough

A second frame, in addition to the one emphasizing workplace learning, has emerged within the acquisition work that has significant implications to the current learning technologies. Some members of the senior leadership within the acquisition community have come to view the credentialing/certification process as necessary, but insufficient for developing the skills and expertise needed by the workforce. "Certification training is a necessary component, but not sufficient" (Study Participant 014 2014). An additional component of the view is that workplace experience drives expertise. "It doesn't matter what a worker knows, it matters what a worker can do" (Study Participant 024 2014).

This frame or view was shaped in part by the experiences of the Assistant Secretary of Defense for Acquisition, Katrina McFarland. Supervisors in acquisition organizations complained to McFarland while she was serving as the President of DAU that some workers could not fully function in their jobs after attending DAU provided certification courses. **"**The customer base [organizations that employ members of the acquisition workforce] said yeah you guys [the DAU] are great and all, but I don't know what you do for me 'cause I've got these people and they've been to two whole weeks of school and I can't do anything with them, want is wrong with you guys" (Study Participant 024 2014). When McFarland asked for specific gaps

in job proficiency she was met with vague generalities. The conclusions drawn by her and others in positions of leadership within the acquisition community were that: 1) workers were sometimes not qualified to do their jobs after DAU training and 2) that supervisors were not equipped to identify and properly address specific gaps in worker knowledge within the workplace. "It became a much deeper problem…the folks that we have in leadership positions over our acquisition workforce were ill prepared to even guide the conversation that they needed to have with their workers to get them pointed in the right direction" (Study Participant 024 2014).

In response, McFarland directed the DAU to assist in structuring a new program to strengthen expertise development within the workplace. The program has come to known as the Acquisition Workforce Qualification Initiative (AWQI). It was originally called the Certification to Qualification (C2Q) Program. That named was discarded because it implied that the certification processes was being discontinued in favor of a new qualification process. The name change also was linked to a boundary defense move made by the DAU (Jasanoff 1990, 14). "But the danger Sterling is this…for us [the DAU] if you're going to be selfish -- you don't wanna -- so we're talking about the Workforce Qualification Initiative *now*, not *from* certification [C2Q] because that implies we are getting away from foundational knowledge" (Study Participant 012 2014). Note that "foundational knowledge" is provided by the DAU training courses in the ALM. The leaders of the Qualification Initiative are now marketing it as additive to the existing credentialing/certification process.

The end state goal of the Qualification Initiative is to provide individual acquisition workforce members and their supervisors a "workforce development tool". The intent is that the tool will allow the DOD to document individual proficiency on specific workplace tasks and

skills, identify skill gaps, and plan for skill development. The DAU was tasked to identify the tasks and develop the accompanying standards of proficiency for each. The DAU started with the career field competencies developed by the Functional Boards. The DAU then asked the questions "what are the workforce members supposed to do with this knowledge set" and "what are the logical or physical outputs from this competency" (Study Participant 024 2014). The DAU then used the answers to develop associated tasks, conditions, and standards. As of August 2014, the DAU has identified approximately 1800 tasks or products that acquisition workers should have the ability to perform or develop. The DAU also developed measures to judge proficiency. These groupings of tasks and measures are referred to as "Qualification Standards" (Study Participant 024 2014).

The Qualification Initiative's ability to build expertise is yet unproven, but its structure does set conditions favorable for tacit knowledge transfer and building contributory expertise. Essentially the program will facilitate and encourage workplace mentoring to pass along critical expertise and knowledge from supervisor to worker. Under the Qualification Initiative, supervisors are to tailor the standards lists for their employees and then evaluate routine work products and awarding "qualification" on a task or product once the worker performs to the appropriate skill level. The concept is not unlike earning a merit badge in Boy Scouts with the exception that workers would not develop a product solely to provide evidence of their proficiency. Instead, they are evaluated on their normal duty performances, versus additional special "qualification" work. This process allows the workers to experience performing task under the observation of an expert within their actual work environment. The desire of the DOD is for this to build expertise in the worker and mentoring skills in the supervisor. "This program is aimed at the supervisors as well as the workers…there were a set of seasoned skills that

resided in a group that had practiced them for a long time that were not finding their way to the new bodies arriving" (Participant 024 2014).

The DOD's goal to increase the level of acquisition expertise using workplace experiences faces at least two failure points. First, there is the risk in the profit motiveless DOD environment that workers will learn how to accomplish tasks, but not necessarily how to "do them right". That is to say, they may not gain the knowledge needed to accomplish task in the most effective and efficient manner. There is some indication from the study participants that there is a risk that some supervisors do not themselves have the right skills to pass along. The DAU's involvement in developing "Qualification Standards" could somewhat reduce that risk. They will not know until the program has operated for some time. The second risk is tied to the limited number of defense technology acquisition programs and the length of time they require to mature. A well-known and respected former Undersecretary of the Army and CEO of a major defense contractor commented in a meeting at the National Academy of Sciences that defense acquisition workers only have the opportunity to experience small portions of weapon systems acquisition life-cycle during their careers. There are a limited number of acquisition programs and they take a very long time to mature. An acquisition workforce member may only be afforded the opportunity to experience major events or decision points once. The result of this situation is that key acquisition leaders may have to manage major activities with which they have no first-hand, real-life experience. Also, supervisors may be challenged to find opportunities to mentor subordinates on acquisition tasks that are not in a shop's current or near-term workflow. This risk speaks to the need to capture and share, to the extent possible, the experiences of those who have had the opportunities. What remains to be seen is whether or not

the DAU's increased efforts to capture knowledge from Mission Assistance engagements or the posting of lessons learned into a repository are capable of reducing this risk in a meaningful way.

In addition to strengthening workplace mentoring to increase expertise levels, the DOD is taking steps to ensure that expertise is available at critical points in organizations. The DOD is developing a process for placing only those possessing the requisite experiential expertise in positions of responsibility in major acquisition programs.

The Undersecretary of Defense for Acquisition, Technology and Logistics has issued guidance on selection of key leaders in acquisition programs. The guidance memorandum titled "Key Leadership Positions and Qualification Standards" states that candidates for key leadership positions in major acquisition programs such as program managers, lead systems engineers, and lead financial managers must have at least eight years of relevant acquisition experience in order to be selected. This experience requirement is double what most career fields require for a level III certification. While this directive does not address expertise development directly, it marks workplace experience as a primary indicator of expertise. The impetus for this guidance can be attributed, at least in part, to an incident where a newly selected lead systems engineer for a major weapons program confided to McFarland that he had never chaired a Critical Design Review. Critical Design Reviews are important engineering events in weapon system design activities. McFarland considered chairing a Critical Design Review to be qualifying experience for any potential lead systems engineer and realized that experience levels of key acquisition program leaders should be more closely monitored and controlled. "Ms. McFarland has energized the Workforce Management Group. They are now very active in looking at KLPs [Key Leadership Positions] and their experience requirements" (Study Participant 017 2014). One underlying assumption in this perspective that experience drives expertise is that

workers/leaders have, in fact, experienced and been mentored in “the right way to do things” and have not acquired expertise in inefficient or ineffective processes.

Summary, Conclusions, and Further Research Opportunities

This research project employed SCOT as a framework to illuminate the socio-technical character of the DOD’s acquisition expertise development enterprise. It specifically focused on the evolution of the DAU as the centerpiece of DOD’s acquisition expertise development system. Additionally, this study drew from Hughes’s theory on the evolution of large-scale technological systems. Particularly, it applied technological momentum as an explanatory concept in analyzing learning technology adoptions. Finally, the study filtered DOD’s choices in expertise building technologies through the lenses of Collins’ and Evans’ model of tactic expertise. This filtering illuminated how the interaction of stakeholder groups and their technological frames along with the momentum of some existing technologies facilitated or hindered tacit acquisition knowledge transfer throughout the DAU’s evolution.

Over the past 50 years, the DOD acquisition expertise development approach has evolved from a strictly brick-and-mortar classroom paradigm into a learning enterprise that expanded knowledge transfer opportunities into cyberspace and workspaces.

Between 1964 and 1992 the DOD sought to develop the expertise of small groups of acquisition managers through a relatively lengthy graduate-school like training experience. Since 1992 and the passage of the Defense Acquisition Workforce Improvement Act the DOD has pursued developing expertise across the entire acquisition workforce. The DOD added web-based training to accommodate the increased demand for training courses. The DOD also transitioned the DAU into a corporate university structure. The DAU developed and implemented a learning construct, the Performance Learning Model that expanded knowledge

transfer paths to include technologies beyond its classroom and distance-learning credentialing courses. Some of the new technologies like targeted Mission Assistance workshops provide significant potential for developing tacit specialty expertise. Other new technologies like Continuous Learning Modules are capable only of explicit knowledge transfer.

The development of expertise within the acquisition workforce, like the weapon systems they acquire, is a socio-technical phenomenon. The DAU as its central technology is a "seamless blend of political, social and technological goals and practices" (Hecht 2008, 88). The Undersecretary of Defense for Acquisition, Technology and Logistics and his principle staff members seek to use the DAU to facilitate change by making it a major channel for advocating and disseminating new policies and guidance. The Functional Leaders for each career field determine the knowledge and skills required for the members of their discipline. The Directors of Acquisition Career Management are responsible for providing opportunities for their workforce members to achieve all training, education and experience requirements mandated by statute and policy. The DAU formulates and executes the curricula for the certification courses.

Other external and internal DAU stakeholder group frames also exert significant influence the acceptance or dismissal of technologies. The DAU faculty, administrators, students, and infrastructure support staffs collide with each other and the Functional Boards, Career Managers, and pentagon staff. Existing, obdurate technologies collide with new, emergent ones. All of these collisions and interactions shaped and continue to shape the technology of expertise development. These shaping for forces at times given rise to technologies of tacit knowledge transfer.

The DAU's movement of knowledge transfer activities closer to the workplace, both physically and logically have generally provided more potential for tacit knowledge transfer.

The DAU's regional campus structure placed acquisition training and knowledge resources physically closer to major acquisition workforce populations. This also made targeted Mission Assistance more assessable to program offices. DAU's online learning tools and resources like the Communities of Practices and lessons learned repositories provide other paths where employees may seek the tacit knowledge that resides with their fellow employees.

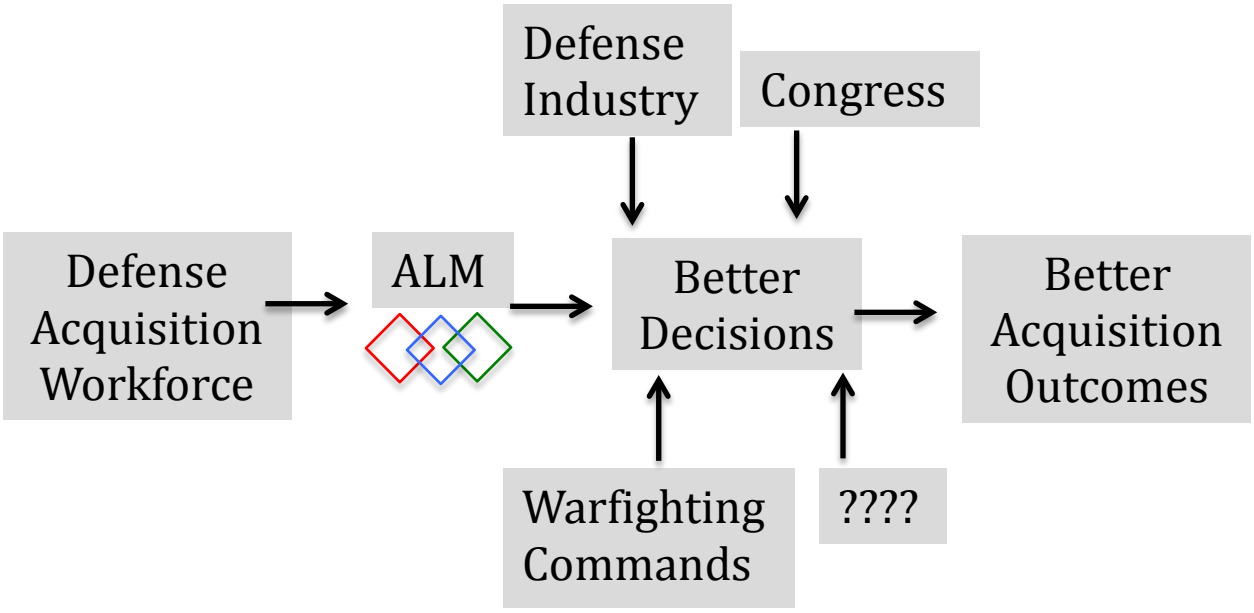
The current evolution of the expertise development model, the Acquisition Learning Model, absorbs the workplace and makes it another technology element. The Qualification Initiative emphasizes the responsibilities of supervisors to assess their subordinates' level of expertise and to mentor them to the requisite level within the workplace. This initiative has the potential to establish or strengthen expert – apprentice relationships in DOD acquisition organizations. This is the immersive social environment identified by Collins, Evans, and Polanyi necessary to build tacit specialty expertise. Whether these developments will result in the improvements sought by the DOD to the input side of the "Linear Model of Acquisition Success" is unknown. This question and others provide areas for further research.

This research project is a broad survey of the socio-technical learning technology landscape. As the pursuit of acquisition expertise continues, the paths taken and tools developed within the socio-technical learning enterprise will provide fruitful areas for researchers to explore. More detailed inquiry into specific technology elements is merited. Particularly, research into the efficacy of the Acquisition Workforce Qualification Initiative is warranted (assuming it matures and deploys as scheduled). Research comparing the relative capacities of instructor-student classroom oriented training vice mentor-protégé workplace training in building expertise would benefit the DOD and STS scholars. Additionally, further study on the capacity of online interactions within communities of experts to transfer tacit knowledge and build

expertise could provide valuable additions to the understanding of expertise development. A study that compares the various learning technology elements to discern which one maximizes gains in expertise would be of great benefit to the defense acquisition and other professional communities. Lastly, research leading to confirmation or rejection of the notion that there is a correlation between successful acquisition program outcomes and the level of expertise of those supporting, directing and managing the programs would benefit the DOD.

The comparison of the "Linear Model of Acquisition" and the ALM illuminates the import of this last topic of research. What is missing from the ALM is the concept of proper judgment or "better decisions" that leads to "better acquisition outcomes". Perhaps there are more actors that influence "better decisions" whose frames and expertise need exploring. Perhaps the view depicted in Figure 14 below is more representative of actual practice.

Figure 14 Revised Model for Acquisition Success



So, the big question that remains open is this one—if defense acquisition itself is a large-scale technology with many socio-technical players, how much of its success or failure can be attributed to one set of players?

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Appendix A- Defense Acquisition University Awards

2001 and 2002 – United States Distance Learning Association Award
- Excellence in Distance Learning Programming

2002 – Corporate University Best-In-Class (CUBIC) Awards
- Best Overall Corporate University
- Best Virtual Corporate University
- Corporate University Leader of the Year

2003 – Gold medal winner of Brandon Hall Best Practices for e-Learning
2003 & 2004 – Winner of the American Society of Training and Development BEST Award
2003 – Corporate University Xchange
- Excellence Award for Measurement
- Excellence Award for eLearning

2003 – *Training* Magazine Top 100

2004 – *Chief Learning Officer* Magazine Learning in Practice Awards
- Gold Award for Learning Innovation
- Bronze Award for Strategic Alignment
- Chief Learning Officer of the Year

2005 – e-Gov Knowledge Management Award
2005 – United States Distance Learning Association Award
- Gold Award for 21st Century Best Practices for Distance Learning
- Gold Award for Excellence in Programming

2005 & 2006 – Best Leadership Development Government/Military by *Leadership Excellence*

2006 – Corporate University Best-In-Class (CUBIC) Awards
- Best Overall Corporate University
- Best Virtual Corporate University
- Best Mature Corporate University
- Corporate University Leader of the Year

2006 – *Chief Learning Officer* Magazine Learning in Practice Awards
- Silver Award for Strategic Alignment

2007 – Winner of the Computerworld Honors Program 21st Century Achievement Award
2007 – *Chief Learning Officer* Magazine Learning in Practice Awards
- Gold Award for Innovation

2009 – Silver Inkwell Awards
- Award of Merit for *Defense AT&L Magazine*

2009 – *Chief Learning Officer* Magazine Learning in Practice Awards
- Vanguard Award
- Learning Team Award

2010 – Brandon Hall Research “Excellence in Learning” Award

2010 – “Sloan – C Effective Practice Award”
2010 – Brandon Hall Research “Excellence in Learning” Award

2011 – Computerworld Honors Laureate
2011 – Learning! 100 Award
2011 – LearningElite Award
2011 – *Chief Learning Officer* Magazine Learning in Practice Award

2012 – *Chief Learning Officer* Magazine Gold Award for Learning Strategy
2012 – *Chief Learning Officer* Magazine LearningElite Award
2012 – Elearning! Media Group Learning! 100 Award
2012 – Federal Government Distance Learning Eagle Award
2012 – DoD Small Business Trailblazer Award

2013 – Global Council of Corporate Universities Gold Award for Best Overall Corporate University
2013 – International Coach Federation Prism Award
2013 – Learning! 100 Award, First Place Nonprofit