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**Air Force Operational Contracting Knowledge Assessment:
Analyzing Explicit and Tacit Contracting Knowledge**

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December 2011**

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ASSESSMENT: ANALYZING EXPLICIT AND TACIT
CONTRACTING KNOWLEDGE**

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AIR FORCE OPERATIONAL CONTRACTING KNOWLEDGE ASSESSMENT: ANALYZING EXPLICIT AND TACIT CONTRACTING KNOWLEDGE

ABSTRACT

The Defense Acquisition Workforce Improvement Act (DAWIA) establishes education and training standards for acquisition personnel. These standards culminate into ascending levels of certification for acquisition professionals based on education, training, and experience. While the intent of DAWIA certification is to ensure acquisition professionals possess the requisite knowledge and experience to perform their duties, currently no method exists to effectively measure an individual's contracting knowledge. The Air Force Operational Contracting Knowledge Assessment (OCKA-AF) attempts to accurately assess an individual's tacit (experiential) and explicit (factual) operational contracting knowledge across the six phases of the contracting process. The assessment tool also identifies knowledge gaps between tacit and explicit knowledge. The OCKA-AF was deployed in the form of a web-based survey to two Air Force operational contracting squadrons and Air Force contracting students attending the Naval Postgraduate School. The survey results were analyzed, upon which recommendations were made to reduce existing tacit and explicit contracting knowledge gaps. Due to its knowledge assessment capability, the OCKA-AF may be beneficial to supervisors and senior contracting leadership in determining whether current training efforts are producing the desired results in knowledge capture or provide insight into areas requiring further training emphasis.

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LIST OF ACRONYMS AND ABBREVIATIONS

ACAT	Acquisition Category
ACO	Administrative Contracting Officer
AETC	Air Education & Training Command
AF	Air Force
AMS	Acquisition Management System
APDP	Acquisition Professional Development Program
AT&L	Acquisition, Technology & Logistics
CCM	Contracting Competency Model
CFCM	Certified Federal Contracts Manager
CGO	Company Grade Officer
CLM	Continuous Learning Modules
CLP	Continuous Learning Points
CMBOK	Contract Management Body of Knowledge
CMMM	Contract Management Maturity Model
DAF	Department of the Air Force
DAG	Defense Acquisition Guidebook
DAP	Defense Acquisition Portal
DAS	Defense Acquisition System
DAU	Defense Acquisition University
DAWIA	Defense Acquisition Workforce Improvement Act
DOD	Department of Defense
DODD	Department of Defense Directive
DODI	Department of Defense Instruction
DODIG	Department of Defense Inspector General
FAR	Federal Acquisition Regulation
FY	Fiscal Year
GAO	Government Accountability Office
GWOT	Global War on Terrorism
HCSP	Human Capital Strategic Plan
IPT	Integrated Product Team

MAJCOM	Major Command
MBA	Master of Business Administration
MDA	Milestone Decision Authority
MDAP	Major Defense Acquisition Program
NCMA	National Contract Management Association
NMS	National Military Strategy
NPS	Naval Postgraduate School
NSS	National Security Strategy
OJT	On-the-Job Training
PCO	Procurement Contracting Officer
RDT&E	Research, Development, Testing & Evaluation
SAF/AQC	Secretary of the Air Force for Acquisition—Contracting
USD	Undersecretary of Defense

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I. INTRODUCTION

A. BACKGROUND

The mission of Air Force Contracting is to “develop and execute responsive strategies and compliant sourcing solutions to enable the global Air Force mission” (DAF, 2011). Contracting personnel are responsible for acquiring resources needed to support the warfighter and ongoing Continental United States operations. To accomplish this task, contracting professionals must adapt to an ever-changing regulatory environment and be knowledgeable in both government and private-sector business practices.

One policy aimed at ensuring the Department of Defense (DoD) contracting workforce is capable and ready to execute mission requirements is the Defense Acquisition Workforce Improvement Act (DAWIA). Passed in 1990 and revamped in 2003, DAWIA was instrumental in the establishment of mandatory standards for DoD contracting personnel. Although not entirely inclusive, it addresses the need for improvements in education and training, the creation of a Defense Acquisition University (DAU), and the establishment of acquisition certifications (10 U.S.C. Ch. 87, 2011). To meet the requirements of this new law, the Air Force implemented the Acquisition Professional Development Program (APDP) (DAF, 2011). Each of the three APDP certification levels requires a specific level of education, training, and experience before an individual is eligible for certification (DAU, 2011).

Although DAWIA standards remain in place today, the acquisition community continues to experience difficulties. For example, the House Armed Services Committee’s report of the Fiscal Year (FY) 2007 defense authorization bill describes the acquisition process as follows:

Simply put, the Department of Defense (DOD) acquisition process is broken. The ability of the Department to conduct the large scale acquisitions required to ensure our future national security is a concern of the committee. The rising costs and lengthening schedules of major defense acquisition programs lead to more expensive platforms fielded in fewer numbers. The committee’s concerns extend to all three key

components of the Acquisition process including requirements generation, acquisition and contracting, and financial management. (U.S. HoR, 2006, p. 350)

Although increased training may improve contracting knowledge, it is time-consuming, costly, and often difficult to determine what, how, and to whom the training should be delivered. To achieve maximum effectiveness, training should deliberately target areas requiring improvement. Additionally, identifying whether factual (explicit) or on-the-job (tacit) knowledge is needed, would bring further improvements. Just as explicit knowledge of the Federal Acquisition Regulation (FAR) is critical to contracting success, Platts and Yeung observe, “there is much evidence to suggest that paying attention to tacit knowledge development is a key dimension to organizational effectiveness” (Platts & Yeung, 2000, pp. 347–355).

B. PROBLEM STATEMENT

Currently, no standard or effective method exists to measure a contracting professional’s knowledge and experience level. A common practice in the Air Force is to obtain an individual’s DAWIA certification level and total number of years in the contracting career field. Unfortunately, this method does not provide an adequate reflection of an individual’s contracting knowledge. Contracting is complex and knowledge-intensive, both from a practical and factual standpoint. If more accurate information concerning an individual’s contracting knowledge is preferred, a time-consuming face-to-face interview is required. The Air Force Operational Contracting Knowledge Assessment (OCKA-AF) measures both explicit (the “know-what”) and tacit (the “know-how”) knowledge and will provide commanders, supervisors, and contracting professionals with a more accurate assessment of an individual’s comprehensive contracting knowledge (Pfeffer & Sutton, 2000).

C. RESEARCH OBJECTIVES

Operational contracting knowledge is difficult to assess due to the wide range of activities and competencies involved in the contracting process. Contracting personnel must retain and apply both factual and practical contracting knowledge to be effective in

their job. The ability to measure both of these types of knowledge expeditiously, and in a single, concise assessment, is a valuable resource for the contracting career field. Unfortunately, this capability does not currently exist. The research seeks to address this issue by accomplishing the following objectives:

1. Develop and distribute the OCKA-AF to assess and measure explicit and tacit contracting knowledge.
2. Perform a gap analysis on OCKA-AF respondent explicit and tacit knowledge results.
3. Provide recommendations for reducing explicit and tacit knowledge gaps.

D. RESEARCH QUESTIONS

The research questions for this project are as follows:

1. Does a gap exist between explicit and tacit contracting knowledge with respect to the six phases of contracting?
2. Are the gaps consistent across the various demographics surveyed?
3. Do any practices, processes, or procedures contribute to the gaps?
4. What are some recommendations to close any existing knowledge gaps?

E. BENEFITS OF RESEARCH

The primary potential beneficiaries of this research project are commanders, supervisors and their subordinates, and contracting professionals. Commanders and supervisors can use the information provided by the assessment tool to quickly determine a contracting professional's overall operational contracting knowledge. The resulting assessment data are useful in determining and adjusting contracting rotation cycles within a squadron and aids in the process of what is commonly known in the Air Force as putting "faces-to-spaces." Another potential benefit of the assessment tool is in the training arena. Individual assessment results are aggregated and used to target specific training needs of an organization. For example, if half of an organization's personnel

score lower than average on tacit questions pertaining to source selection, the organization can tailor its training to address the identified deficits.

Finally, another potential benefit is the opportunity to provide early feedback concerning job competency and performance. Commanders or supervisors can better mentor their subordinates, ensuring they are receiving the right training and knowledge. Enhanced mentoring should result in improved skills and abilities, and ultimately aid an individual's career in the form of better assignment opportunities and advancement.

F. LIMITATIONS OF RESEARCH

Three limitations of the research were identified. First, the research is limited by the assumption that the Certified Federal Contracts Manager (CFCM) study guide practice test questions are representative of the CFCM certification test. Further, it is assumed the CFCM certification test is reflective of the National Contract Management Association's (NCMA's) Contract Management Body of Knowledge (CMBOK). Since the explicit knowledge assessment questions, taken from the CFCM study guide practice test questions, are only useful when directly linked to a contracting-related competency, this limitation should be acknowledged.

Second, the research is limited to the integrity and proper assessment of experience by the survey respondents. In the tacit knowledge section of the assessment tool, respondents self-assess the depth and complexity of their contracting experience. The accuracy of the data is limited by the honesty of the respondents' inputs.

Lastly, the research is limited by the lack of physical oversight of respondents during assessment completion. While individuals are expected, and instructed, to not use any external resources during the knowledge assessment, the lack of physical oversight prevents ensuring no external resources are used. The use of external resources may provide respondents with answers to explicit knowledge questions, resulting in inaccurate data.

G. METHODOLOGY

We started the research with a thorough review of relevant literature. The research scope is limited to three areas of literature for review: 1) The current government contracting workforce environment; 2) government contracting standards, certifications, knowledge, and education; and 3) knowledge management, with a focus on explicit and tacit knowledge. Numerous journal articles, books, and government reports are available to review for the research.

Next, the information gained through the literature review is used to develop an assessment tool that measures an individual's explicit and tacit operational contracting knowledge. The assessment was distributed to Air Force contracting professionals at two contracting squadrons and to Air Force contracting students attending the Naval Postgraduate School (NPS).

Finally, completed assessments are individually scored and the data are aggregated to determine if any knowledge gaps emerge, given the demographic inputs. Based upon analysis of the data, we reveal the findings and offer recommendations to reduce any existing tacit and explicit knowledge gaps. A final conclusion and areas for further research are offered at the end of the report.

H. ORGANIZATION OF REPORT

The research is divided into six chapters.

Chapter I–Introduction. This chapter consists of the background, problem statement, research objectives, research questions, benefits of research, limitations of research, and the methodology used in the research process.

Chapter II–Literature Review. This chapter provides an in-depth review of literature pertaining to the research objectives. The first section of the review focuses on education, training, and experience requirements for government contracting personnel, while section two delves into tacit and explicit knowledge.

Chapter III–Air Force Contracting Organizational Framework. This chapter provides the organizational framework for Air Force contracting, to include the authoritative structure and three distinctive types of contracting—systems, operational, and contingency contracting.

Chapter IV–Research Methodology. This chapter details the research methodology used to develop and distribute the operational contracting knowledge assessment tool. Specifically, it addresses assessment construction, assessment validity, assessment content, assessment audience, data collection procedures, data analysis, assumptions, and limitations of the research.

Chapter V–Results. This chapter discusses the research results, describes the process used to analyze the data, and provides recommendations for closing the explicit-tacit knowledge gap.

Chapter VI–Summary, Conclusions, and Areas for further research. This chapter summarizes the research, presents conclusions, and provides areas for further research.

I. SUMMARY

This chapter provided a background of Air Force contracting and introduced some issues facing the contracting workforce. The research objectives were identified, followed by the research questions and benefits of research. Next, the research methodology described the framework used to complete the research report. The research methodology included the literature review, assessment tool development and distribution, and data analysis. Lastly, the organization of the report, by chapter, was reviewed. The next chapter provides a review of the literature used for this research.

II. LITERATURE REVIEW

A. INTRODUCTION

The creation of a tool that more accurately assesses an individual's operational contracting knowledge is an invaluable resource to an organization's leadership in meeting mission requirements of an Air Force contracting organization. To build an effective and efficient contracting knowledge assessment tool, it is first important to understand the education, training, and experience requirements of contracting personnel. Additionally, understanding the different types of knowledge and how to measure and assess these types of knowledge, would provide a more accurate and thorough assessment.

The literature review begins by exploring the Department of Defense (DoD) contracting workforce and how it professionally develops personnel. More specifically, the research seeks to identify education and training requirements, career field dynamics, and influential bodies of contracting knowledge. The research then transitions into the field of knowledge management. In this realm, the study examines the distinction between explicit (factual) and tacit (experiential) knowledge, and when combined, more accurately measures an individual's comprehensive knowledge.

B. THE CURRENT CONTRACTING WORKFORCE ENVIRONMENT

From Government Accountability Office (GAO) reports to high-profile news stories involving ethics violations and procedural errors (GAO, 2011), the DoD contracting workforce is constantly subjected to unflattering criticism, often attributable to limited experience and a lack of training (Gansler, 2007). A December 2008 article published by the Undersecretary of Defense for Acquisition, Technology & Logistics USD(AT&L) describes the background information contributing to this increasingly problematic situation:

Although the size of the contracting workforce has been stable since 2001, significant mission demands—such as the ongoing Global War on Terrorism—as well as the pending departure of the Baby Boomer workforce warrant a review of the appropriateness of the current

workforce size and its skills. From 2001 to 2007, the number of contracting actions involving more than \$100,000 has increased by 62 percent, while the corresponding dollars being obligated increased by 116 percent. Additionally, 73 percent of the DoD civilian contracting workforce is part of the Baby Boomer generation or is older. (Manning, Thomas, & Brooks, 2008, pp. 44–47)

Similarly, a 2009 GAO report states: “Since 2001, the Department of Defense (DoD) spending on goods and services has more than doubled to \$388 billion in 2008, while the number of civilian and military acquisition personnel has remained relatively stable” (GAO, 2009). The report highlights a deeper issue that is indicative of the nature of the career field—where money is involved, there will inevitably be risk. Accordingly, DoD contract management remains on the GAO’s High-Risk Series list since first appearing on the list in 1992 (GAO, 2005, 2010). Areas of government vulnerable to fraud, waste, and abuse are placed on the list (GAO, 2011). It is important to note that fraud, waste, and abuse can also result in the unintentional result of inadequate resources, such as personnel (lack thereof) and training (negligence). Acquisition problems were so prevalent that in April, 2009, the DoD Inspector General (DoDIG) issued a summary report of previous acquisition-related reports completed between 2003 and 2008. Within the 142 reports involving acquisition and contract administration, Table 1 identifies the 12 areas listed as the most problematic (DoDIG, 2009).

Table 1. List of 12 Problem Areas Identified in DoDIG Reports

1. Completeness of Acquisition Support Data (65 reports)
2. Sufficiency of Requirements (50 reports),
3. Adequacy of Contract Pricing (52 reports),
4. Commercial Acquisition (10 reports),
5. Sole-Source Selection (32 reports),
6. Past Performance (8 reports),
7. Multiple-Award Contracting (10 reports),
8. Performance-Based Service Contracts (13 reports),
9. Oversight and Surveillance (55 reports),
10. Inter-Agency Contracting/Military Interdepartmental Purchase Requests (20 reports)
11. Potential Antideficiency Act Violations (27 reports)
12. Material Internal Control Weaknesses (58 reports).

All of the negative publicity has spurred an increased emphasis on improving contracting workforce knowledge and organizational process capability. In the acquisition career field, DoD contracting ranked second in number of personnel with 27,655 (GAO, 2010). In the Air Force alone in Fiscal Year (FY) 2009, there were a total (civilian and military) of 7,443 contracting personnel. According to data obtained by GAO from Defense Acquisition University (DAU), at the conclusion of FY09, roughly 90% of DoD's acquisition workforce had accomplished, or were close to, finishing their required certification training (GAO, 2010). The report also notes improvements in DAU's education and training programs; however, DoD is still wanting in their ability to provide quantifiable information concerning the effectiveness of the education and training its workforce has received (GAO, 2010).

C. EDUCATION AND TRAINING IN CONTRACTING

1. Defense Acquisition Workforce Improvement Act

The policy for current DoD contracting professional development is the Defense Acquisition Workforce Improvement Act (DAWIA). With the force of law, DAWIA established education, training, and experience requirements for the DoD contracting community (10 U.S.C. Chapter 87 §§ 1721-1730). Not only did DAWIA develop new standards for contracting professionals, it also mandated the creation of the DAU structure, enabling the means by which contracting personnel could receive profession-specific training (10 U.S.C. Chapter 87 §§ 1741-1760).

DAWIA's intent is to crystalize formal training and education in the form of certification to create a more knowledgeable and professional acquisition corps:

Specifically, acquisition is seen as possessing the attributes of a unique knowledge base requiring extended training and experience. The workforce then becomes professional by meeting the requirements for acquisition education, training, experience, and tenure provided for under DAWIA. (Snider, 1996)

Snider (1996) continues by discussing how DAWIA's attempt to professionalize the acquisition career field may yield some unintended consequences. One such example is that "certification requirements leads to a view of certification as an end rather than a means," commonly referred to as careerism, or "ticket punching" (Snider, 1996). While there is a debate regarding the resultant outcomes of DAWIA, critics both within and external to the federal government are quick to voice their opinions. DoD is not insulated from such criticism and increasing political pressure, as demonstrated in a 2009 GAO Report: "In March 2009, we [GAO] reported that USD(AT&L) lacks complete information on the skillsets of the current acquisition workforce and whether these skillsets are sufficient to accomplish DoD's missions" (GAO, 2009). Understanding current capabilities in the defense contracting workforce is of growing importance to DoD.

2. Defense Acquisition University

Established in 1992, as required by DAWIA, the mission of DAU is to “Provide a global learning environment to support a mission-ready Defense Acquisition Workforce that develops, delivers, and sustains effective and affordable warfighting capabilities” (DAU, 2011). DAU provides focused education and training for the contracting career field along with 16 other acquisition-related specialties (DAU, 2011). DoD’s perspective of DAU’s strategic fit within the Department’s multifaceted training approach, as it relates to acquisition training, is shown in Figure 1 (GAO, 2010).

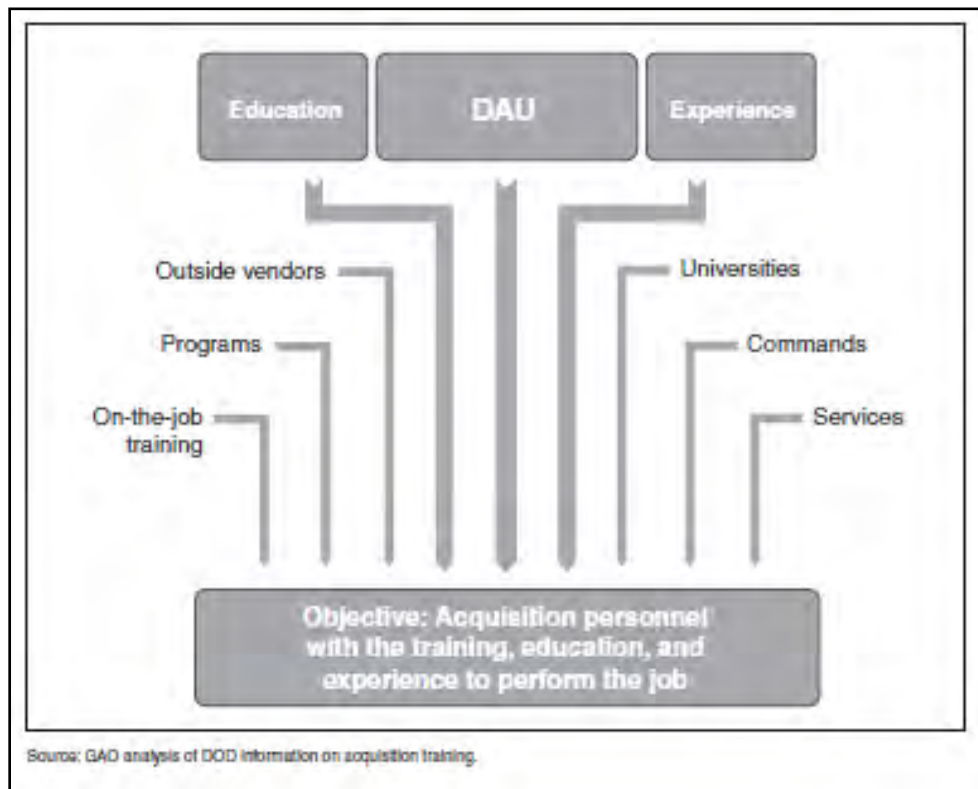


Figure 1. DoD’s Multifaceted Training for Acquisition Personnel. From (GAO, 2010)

The entire contracting core curriculum covers all three DAWIA certification levels, and consists of 18 courses delivered to students by either distance learning or in residence. Although these are the minimum required courses for certification, they are supplemented with optional “core plus” courses designed to deliver assignment-specific training within each functional area (DAU, 2011). The “core plus” offerings are spread among 157 Continuous Learning Modules that are a product of the Engaged Learner

Architecture initiative (USD(AT&L), 2007, p. 28). In addition to the aforementioned functional training courses, a nominal level of education and experience is required before certification is granted. For example, Level I contracting certification requires six DAU courses, 24 semester hours in business courses, a Baccalaureate degree in any field of study, and one year of contracting experience. Department of Defense Instruction (DoDI) 5000.66 also states that members of the AT&L workforce “shall acquire a minimum of 40 continuous learning points (CLPs) every fiscal year as a goal and 80 CLPs is mandatory within two years.”

With so much emphasis placed on acquisition reform in recent years, Figure 2 shows how DAU has consistently increased the number of course graduates to meet the demand for trained acquisition professionals. According to the 2010 DAU annual report, “In FY10 ... [DAU] provided 7.9 million hours of training...graduated 238,851 students...and increased continuous learning modules completions from 494,568 to 624,859” (DAU, 2010, p. 3). Of the 238,851 graduates, 45,883, or approximately 19%, were in-residence courses (DAU, 2010, p. 3). Overall, DAU graduation rates are consistently increasing, with the vast majority (approximately 81%) from web-based courses.

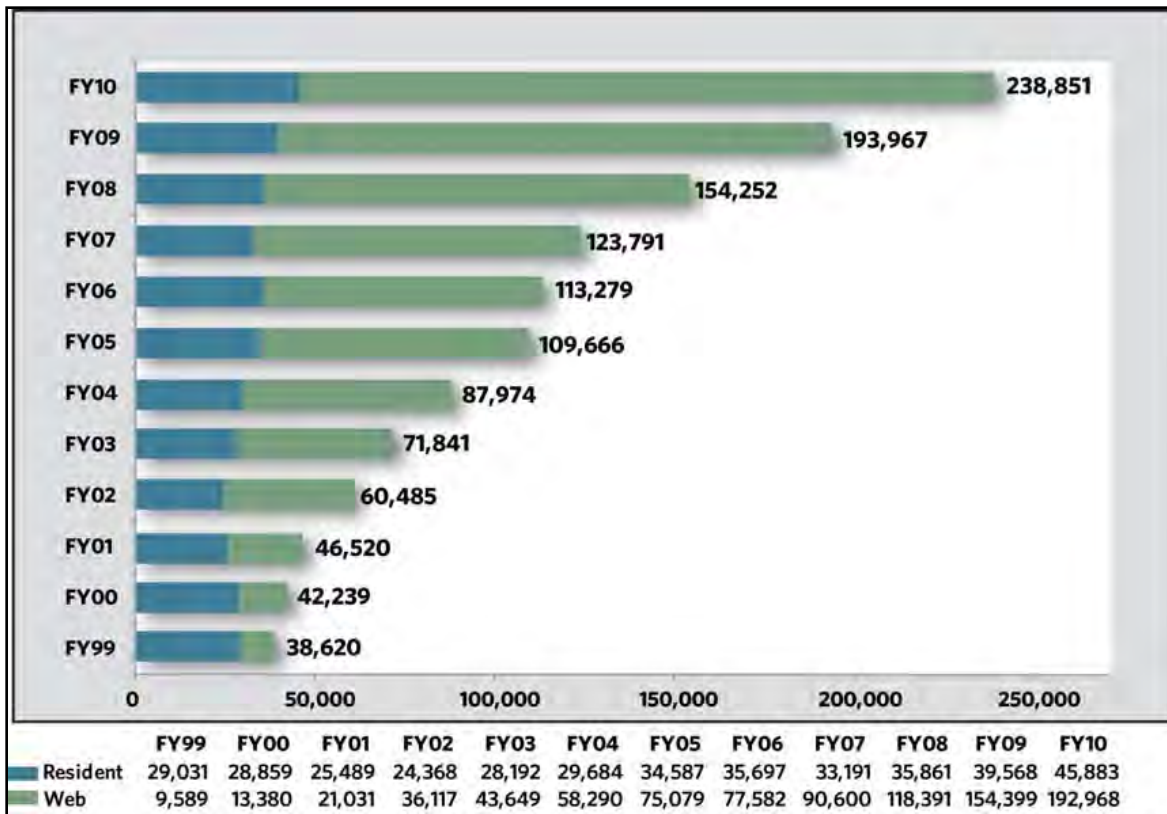


Figure 2. DAU Graduates (Resident and Web-based). From (DAU, 2010)

3. AT&L Human Capital Strategic Plan

DAWIA, enacted in 1990 and revised in 2003, “provided the USD(AT&L) authority to establish human capital policy and procedures to manage the DoD AT&L workforce” (USD(AT&L), 2007, p. 3). USD(AT&L) authority, coupled with the need to manage an increasingly vital and complex system, led to the creation of the Human Capital Strategic Plan (HCSP). The first version of the AT&L HCSP, referred to as version 1.0, was established in 2006. Upgraded in 2007 to version 3.0, the HCSP incorporates successes since version 1.0 was released, and re-iterates the goal for a “high performing, agile, and ethical workforce” (USD(AT&L), 2007, p. 2). The HCSP contains six goals, of which three are directly related to acquisition competency and development initiatives. The three goals and relevant enabling objectives, taken directly from the HCSP, are as follows:

- Goal 1: Align and fully integrate with overarching DoD human capital initiatives.
 - 1.3 Improve and standardize DoD AT&L workforce competencies.
 - 1.4 Establish DoD AT&L governance to ensure workforce competency.
- Goal 4: Provide learning assets at the point of need to support mission responsive human capital development.
- Goal 6: Recruit, develop, and retain a mission-ready DoD AT&L workforce through comprehensive talent management

The goals and objectives clearly define the critical need to establish and standardize the essential competencies required in the workforce, then focus on recruiting, developing, and retaining the personnel with those competencies.

4. Contracting Career Progression

DAWIA's intent of continuous learning is to incrementally enhance and increase knowledge to keep contracting personnel on the forefront of acquisition trends and to reduce stagnation in the career field. Along with learning, emphasis is also placed on the development of personnel. This led the Air Force to establish formal career paths in the form of pyramids, shown in Figures 3, 4 and 5, to aid in the development of acquisition professionals. These pyramids depict the stages of an individual's career progression by illustrating various assignment opportunities at different points in time and by grade levels.

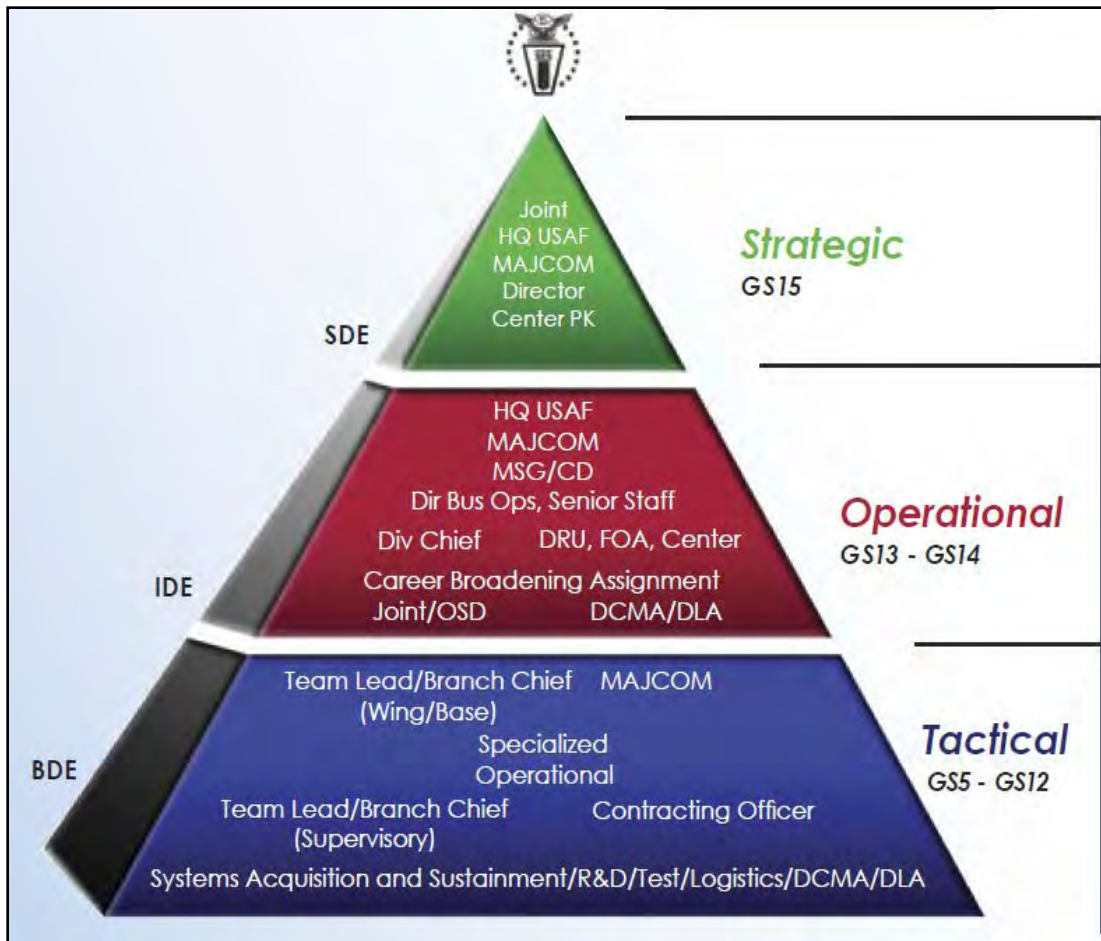


Figure 3. Contracting Career Path Pyramid – Civilian. From (DAF, 2005, p. 15)

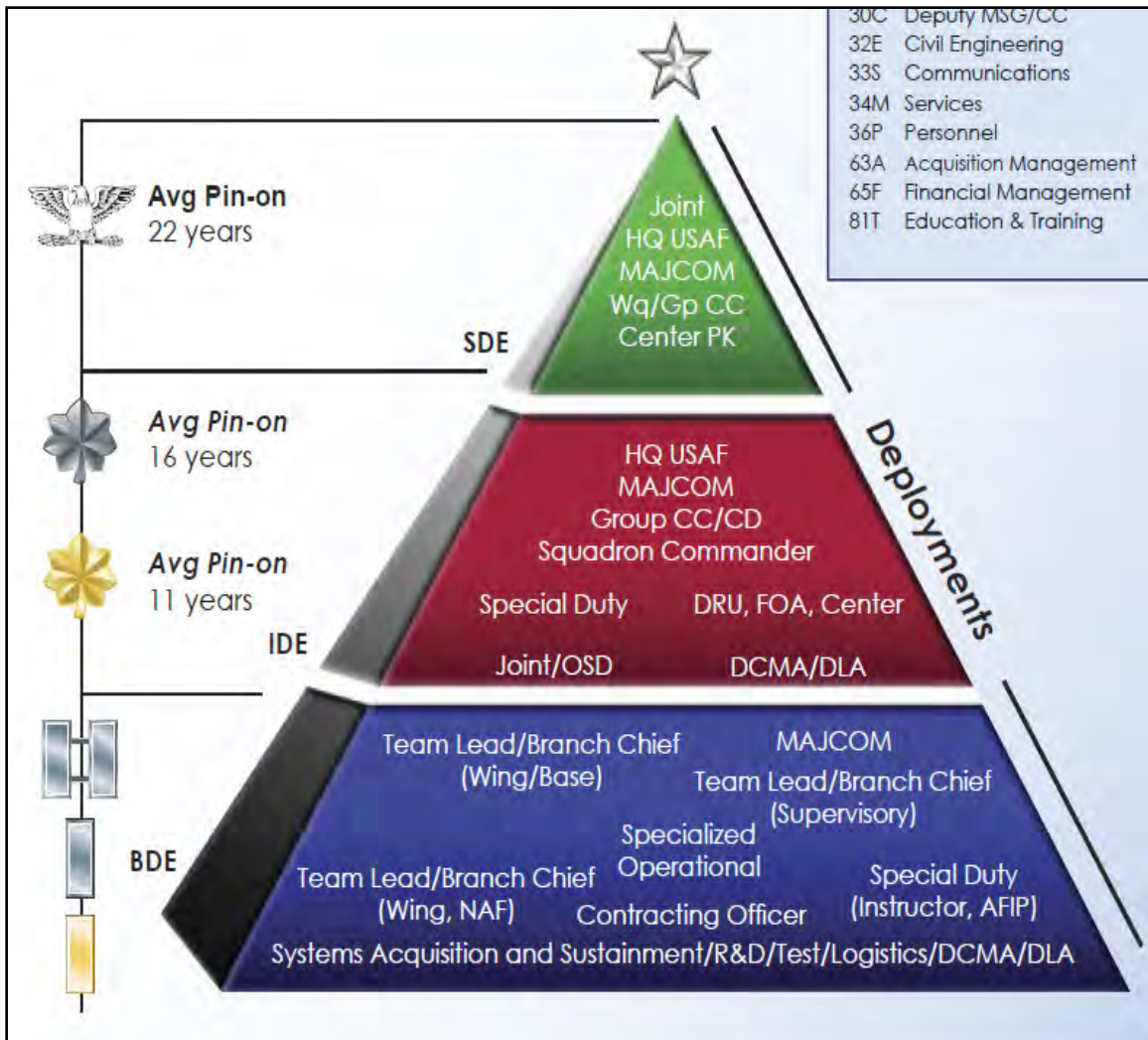


Figure 4. Contracting Career Path Pyramid – Officer. From (DAF, 2005, p. 16)

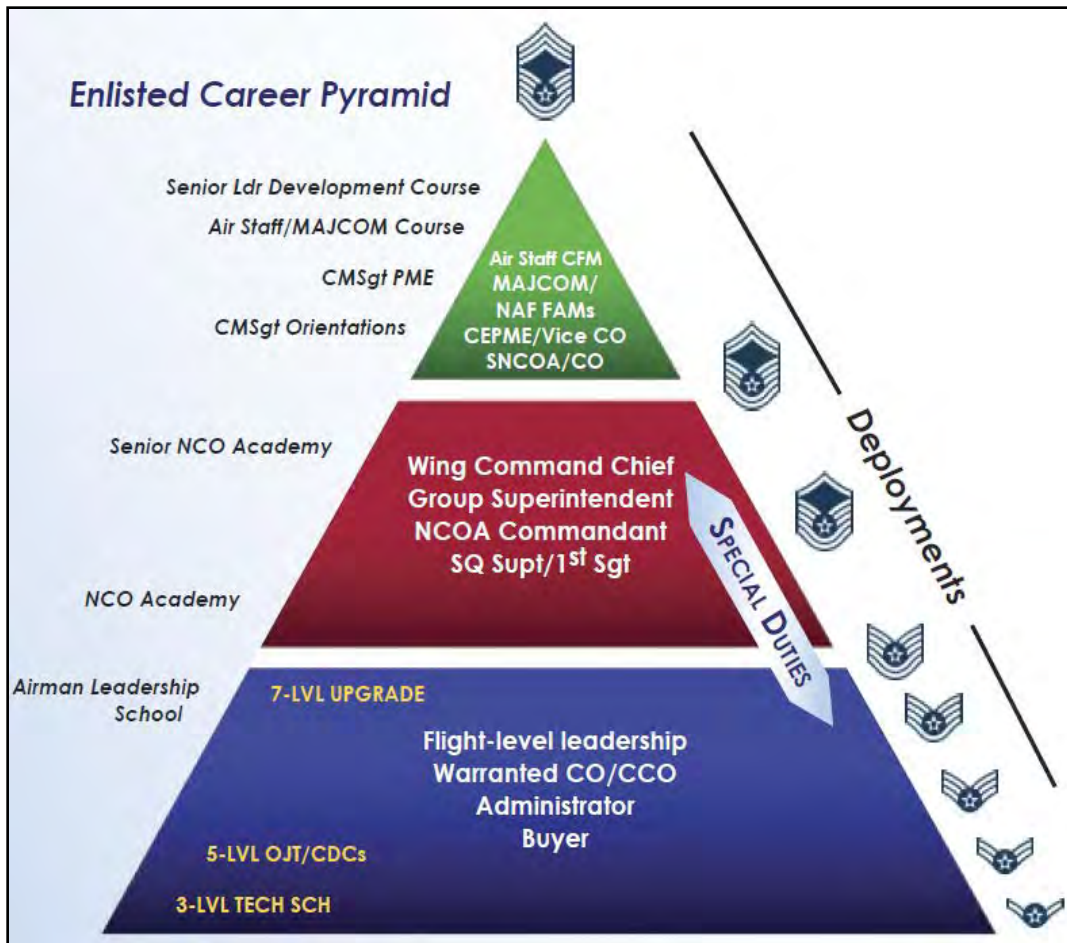


Figure 5. Contracting Career Path Pyramid – Enlisted. From (DAF, 2005, p.17)

5. National Contract Management Association

Aligning with the idea of career progression and learning, the National Contract Management Association (NCMA), established in 1959 as an independent, nationally recognized professional organization, became a point of knowledge sharing and interaction amongst acquisition professionals. According to NCMA’s website, its mission “is to advance the contract management profession” (NCMA, 2011a).

NCMA also provides contract professional certifications; each of which requires the recipient to pass a written examination and have a specified number of years of experience. The certification most applicable to this research is the Certified Federal Contracts Manager (CFCM) certification. The CFCM requires successful completion of

a one-hundred and fifty question multiple-choice exam and a minimum of one year of contracting experience (NCMA, 2011a). The exam tests the body of knowledge of the Federal Acquisition Regulation (FAR).

Although the FAR is the substratum of the CFCM exam, the Contract Management Body of Knowledge (CMBOK), developed by NCMA, provides the framework for the CFCM exam. Figure 6 displays an outline of how the CMBOK is broken down into competencies that encompass the critical aspects of the contract management function. *Contract Management Body of Knowledge, 3rd edition*, explains, “This analysis is generally accomplished via a job analysis, which identifies the tasks performed by contract management professionals as well as the knowledge areas required for performance” (NCMA, 2011b, p. 3).

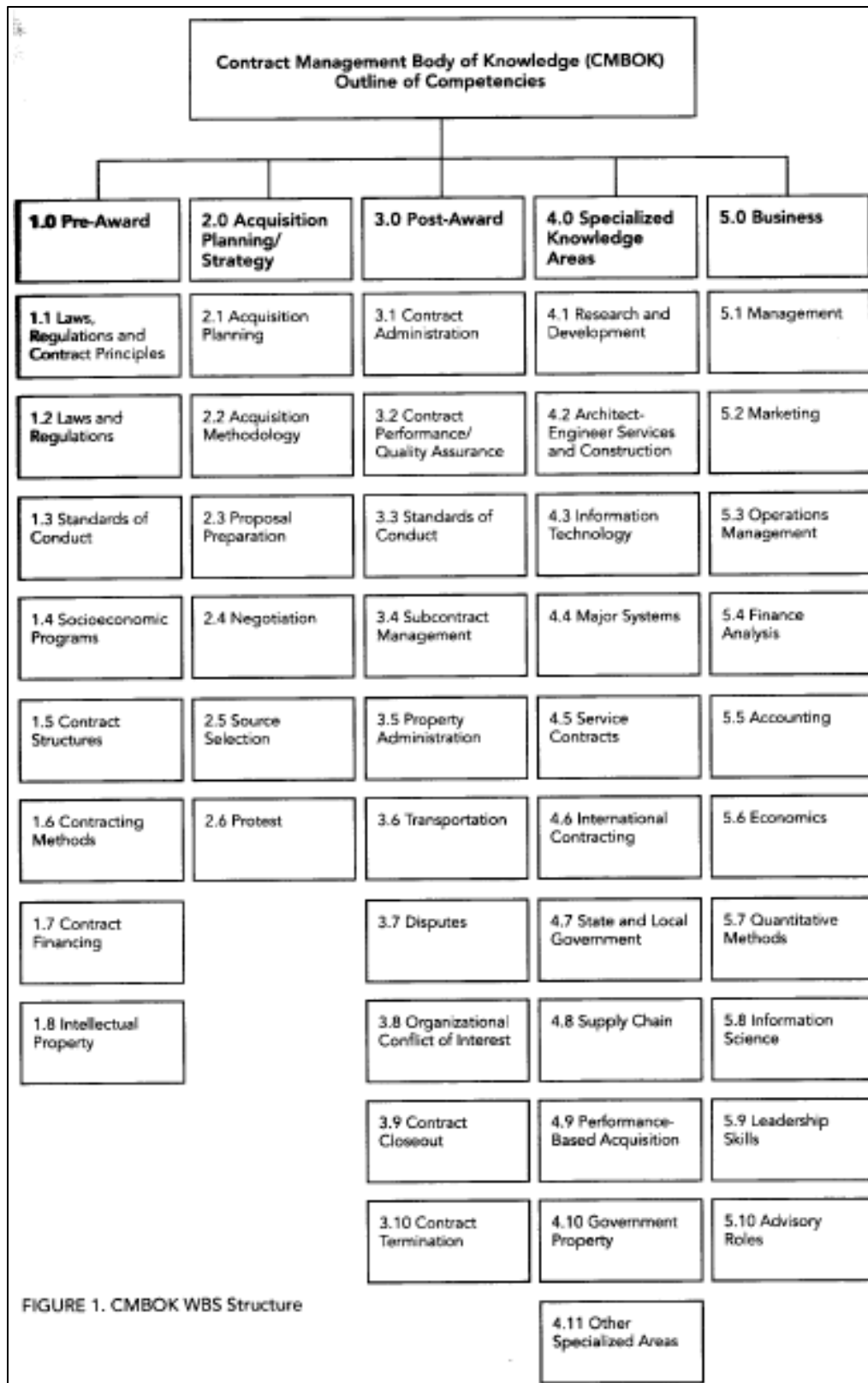


Figure 6. Outline of CMBOK Competencies. From (NCMA, 2011b, p. 9)

D. ASSESSING KNOWLEDGE

1. Explicit and Tacit Knowledge

An abundance of literature is available on the subject of explicit and tacit knowledge as it pertains to knowledge management. Numerous academic journals, scholarly articles, and books were examined relating to the study of knowledge and its composition. According to the literature, the origin of tacit and explicit knowledge came about in the 1950s. Michael Polanyi introduced the idea of tacit knowledge in 1958 in *Personal Knowledge*. As Polanyi observes; “Things which we can tell, we know by observing them; those that we cannot tell, we know by dwelling in them” (Polanyi, 1958, p. 14). Polanyi is discussing how a gap exists between tacit, or experience, and explicit, or factual, knowledge. Polanyi’s work altered the way knowledge is perceived, and years later, provided the stepping stone for new areas of study on how to transfer one type of knowledge to the other.

Nonaka and Takeuchi (1995), in their book on why Japanese companies have competitive advantages in knowledge creation, explain, “[Western observers] take for granted a view of the organization as a machine for information processing....And it is a view of knowledge as necessarily explicit—something formal and systematic” (Nonaka & Takeuchi, 1995). They follow with the idea that Japanese companies are more successful at innovation and knowledge creation because “They recognize that the knowledge expressed in words and numbers represents only the tip of the iceberg. They view knowledge as being primarily tacit” (Nonaka & Takeuchi, 1995). The authors discuss a “linkage between the outside and inside” that “brings about continuous innovation” (Nonaka & Takeuchi, 1995). The linkage refers to how knowledge is shared throughout the organization. They further discuss that competitive advantage is achieved in a knowledge “conversion process” involved with “knowledge that is accumulated from the outside...shared widely within the organization, stored as part of the company’s knowledge base, and utilized...in developing new technologies and products” (Nonaka & Takeuchi, 1995). The advantages associated with being able to transfer knowledge, and between types of knowledge, would not go unnoticed in the business world.

Understanding issues involving the gap between explicit and tacit knowledge was a goal of Pfeffer and Sutton (2000). They observed even though organizations know this gap exists, and that correction is needed, the gaps remain unfilled (Pfeffer & Sutton, 2000). They refer to this knowledge gap between tacit “know how” and explicit “know what” as the “knowing-doing gap” (Pfeffer & Sutton, 2000). The authors detail how companies often come up with a good plan for filling the gap, but they fall into the “smart talk trap” of not following through, thus failing to “turn knowledge into action” (Pfeffer & Sutton, 2000). Pfeffer and Sutton (2000) reveal numerous causes for the “knowing-doing gap,” but more importantly, as shown in Table 2, provide “Eight Guidelines for Action.” Understanding the knowledge gap is important, but how does an organization determine what knowledge is needed for their profession?

Table 2. Eight Guidelines for Actions. From (Pfeffer & Sutton, 2008)

Why before How: Philosophy Is Important	Knowing Comes from Doing and Teaching Others How
Actions Count More Than Elegant Plans and Concepts	There Is No Doing without Mistakes. What Is the Company’s Response?
Fear Fosters Knowing-Doing Gaps, So Drive Out Fear	Beware of False Analogies: Fight the Competitions, Not Each Other
Measure What Matters and What Can Help Turn Knowledge To Action	What Leaders Do, How They Spend Their Time and How They Allocate Resources, Matters

2. Department of Defense Contracting Competency Model

The DoD Contracting Competency Model (CCM) is an attempt to “analyze current and future workforce capabilities” and consists of numerous contracting competencies identified by subject matter experts. The model resulted in the establishment of 28 technical competencies which are displayed in Table 3 (Manning et al., 2008). Although the model provides competencies upon which to assess contracting knowledge, the range of competencies is very broad and fragmented.

Table 3. Twenty-Eight Technical Contracting Competencies.
From (Manning et al., 2008)

Determination of how best to satisfy requirements for the mission area	Source selection	Proposal evaluation (contracting by negotiation)	Negotiate forward pricing rates agreements and administer cost accounting standards
Consider socio-economic requirements	Contract award	Initiation of work	Contract termination
Promote competition	Process protests	Contract performance management	Procurement analysis
Source selection planning	Justification of other-than-full and-open	Issue changes and modifications	E-business and automated tools
Solicitation of offers	Terms and conditions	Approve payment requests	Activity program coordinator for purchase card
Responsibility determination	Preparation and negotiation	Close-out contracts	Construction/architect and engineering
Bid evaluation (sealed bidding)	Advanced cost and/or price analysis	Addressing small business concerns	Contracting in a contingent and/or combat environment

3. Department of Defense Contracting Competency Assessment

The DoD CCM provides the foundation of the DoD contracting competency assessment. According to the March 2008 Competency-based Management for the DoD-wide Contracting Community Overview Brief, the assessment serves the following three purposes (DPAP, 2008):

- Complete an inventory of competencies which exist in the DoD-wide contracting workforce.
- Identify current and projected competency gaps.
- Support workforce development in ways to best fit the strengths and weaknesses of the workforce and the needs of the contracting mission.

The assessment population consists of the entire DoD contracting community along with all contracting supervisors (DPAP, 2008). The subjects were asked to rate the “frequency, proficiency, and criticality for each of the technical and professional competencies” listed in the CCM (DPAP, 2008). Once completed, the results will enable

the DoD to understand current capabilities, and to determine what training is required. The assessment consists of questions asking the subject, and supervisor, to measure the subject's proficiency levels in certain competencies, but lacks objective, explicit knowledge questions.

4. Contract Management Maturity Model

The Contract Management Maturity Model (CMMM©) is a useful tool that assesses the level of maturity of an organization's contracting processes (Garrett & Rendon, 2005). This is achieved by dividing the contract management process into six individual phases, and then assessing the maturity of the organization's processes as they pertain to each phase. The six phases identified by the model are Procurement Planning, Solicitation Planning, Solicitation, Source Selection, Contract Administration, and Closeout (Garrett & Rendon, 2005). Conveniently, each of the competencies identified in the CCM is attributable to one of the six phases in the CMMM©. Although the CMMM© assesses an organization's process capabilities, the CMMM© results can provide some insight on the organization's workforce competencies, as well as knowledge sharing opportunities.

5. Explicit and Tacit Knowledge in the Air Force

In a sense, DAWIA requirements for acquisition personnel revolve around experience, education, and training—all components of explicit and tacit knowledge. Contracting professionals increase their explicit knowledge through DAU's Core and Core Plus courses. In the Air Force, the DAU courses that an individual has completed often represent that individual's explicit knowledge. To illustrate this, all courses taken by an individual are displayed on the acquisition career record within the Acquisition Career Management System. On the other hand, the Air Force frequently measures an individual's tacit knowledge by the amount of time the individual has served within an acquisition coded career field. This experience information is also included in the individual's acquisition career record, possibly implying the Air Force's assumption that the more time an individual spends within an acquisition career field, the more "hands-on" acquisition experience that individual has achieved. Accordingly, the DAWIA

certification levels achieved are assumed to represent an individual's composite knowledge. The assumption that time spent in the acquisition field is equivalent to tacit knowledge is one focus area of this research.

E. SUMMARY

This chapter provided a review of the literature pertaining to Air Force contracting and knowledge management. DAWIA legislation provided the foundation for contracting experience, training, and education standards, along with the creation of the Defense Acquisition University. Since the inception of DAWIA, the contracting workforce has encountered retention and experience issues, while workload has continually increased. This has brought contracting knowledge and experience to the forefront as indicated by the 2007 Contracting Competency Assessment. Accurately assessing knowledge guided the literature review into the realm of knowledge management. The literature provided significant insight into knowledge assessment by showing that comprehensive knowledge is a combination of both tacit (experiential) and explicit (factual) knowledge. Since these two domains of knowledge within Air Force contracting is the focus of this research, the next chapter discusses the contracting organization and the different types of contracting within the Air Force.

III. AIR FORCE CONTRACTING ORGANIZATIONAL FRAMEWORK

A. INTRODUCTION

Air Force Contracting is a far-reaching and complex career field. Air Force Policy Directive 64-1 states “the Air Force relies on its contracting system to acquire the supplies and services essential to its operations and warfighting mission...[and] will be responsive to mission needs and requirements” (DAF, 2006). The lines of authority are complicated in that contracting personnel have an operational responsibility to their military commander or program manager, and contracting authority delegated from the Secretary of Defense. Air Force Contracting policies and procedures are pushed down through multiple channels. As depicted in Figure 7, overarching Air Force contracting structure originates with the Office of the Assistant Secretary of the Air Force for Acquisition—Contracting (SAF/AQC), and continues through multiple levels, eventually reaching the contracting officer.

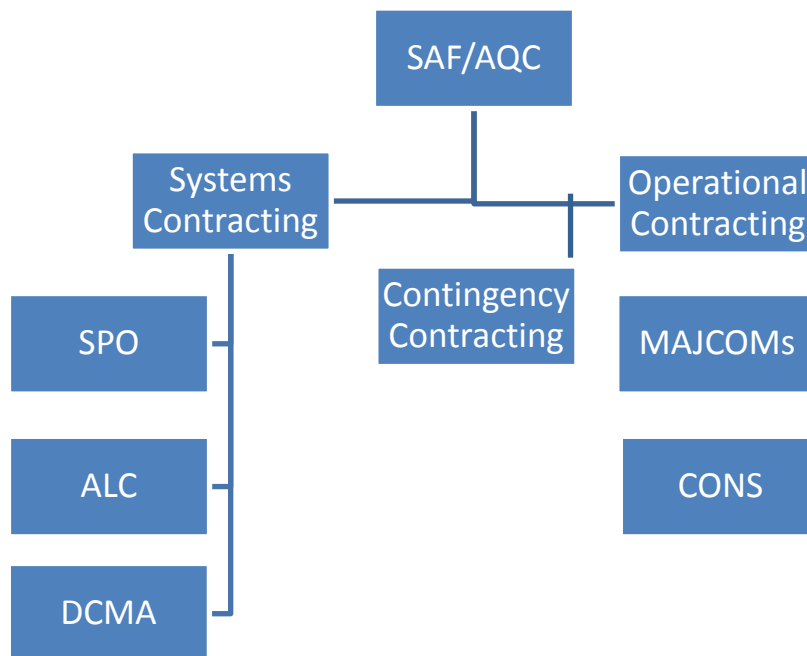


Figure 7. Air Force Functional Contracting Structure. From (DAF, 2011)

Implementation of these policies occurs in two distinct areas of contracting: weapon system acquisition and operational contracting. While the missions of both areas are to support the warfighter, the scope of support is generally very different. Weapon system contracting focuses on acquiring and sustaining weapon systems (aeronautical, space, and electronic) for use across the Air Force, while operational contracting focuses on installation/Major Command (MAJCOM) support. Specific knowledge requirements are necessary in each area of contracting.

B. OFFICE OF THE ASSISTANT SECRETARY OF THE AIR FORCE FOR ACQUISITION–CONTRACTING (SAF/AQC)

SAF/AQC is the highest tier of contracting authority within the Department of the Air Force (DAF) and is directly responsible to “the Assistant Secretary of the Air Force, Acquisition (SAF/AQ), [who] is the Senior Procurement Executive (SPE)” (DAF, 2009, p. 3). As head of Air Force contracting, SAF/AQC provides and oversees the “policies, procedures, and performs surveillance of major command contracting activities” (DAF, 2009, p. 3). Additionally, SAF/AQC “serves as the Competition Advocate General for the Air Force, acts as the senior contracting advisor to the SPE and provides functional management for Air Force contracting personnel” (DAF, 2009, p. 3).

C. SYSTEMS CONTRACTING

The purpose of system acquisition and its personnel, as described by the Defense Acquisition Guidebook (DAG), is to:

...manage the Nation's investments in technologies, programs, and product support necessary to achieve the National Security Strategy (NSS) and support the United States Armed Forces...to rapidly acquire quality products that satisfy user needs with measurable improvements to mission capability at a fair and reasonable price. (DoD, 2006)

The primary role of Procurement Contracting Officers (PCOs), Administrative Contracting Officers (ACOs), contract negotiators, contract specialists and contract managers in system acquisition is to ensure that everything needed is properly acquired. DoDI 5000.02 identifies the Program Manager as the individual primarily responsible for a Major Defense Acquisition Program (MDAP) Acquisition Category (ACAT) I/IA,

major system (ACAT II), or automated information system (ACAT III). Air Force system programs fulfill numerous mission requirements through the development, enhancement or sustainment of new or existing fighters, bombers, tankers, electronic systems, human systems, armament, and reconnaissance systems. Figure 8 lists examples of Air Force MDAPs.

261	AEHF	Advanced Extremely High Frequency Satellite	MDAP	Air Force
185	AMRAAM	Advanced Medium Range Air-to-Air Missile AIM-120	MDAP	Air Force
375	ASIP	Airborne Signals Intelligence Payload	MDAP	Air Force
224	B-2 EHF SATCOM AND COMPUTER INCREMENT I	B-2 Extremely High Frequency Satellite Capability Increment I	MDAP	Air Force
376	B-2 RMP	B-2 Radar Modernization Program	MDAP	Air Force
298	C-130 AMP	C-130 Avionics Modernization Program	MDAP	Air Force
220	C-130J	C-130J Hercules	MDAP	Air Force
183	C-27J	C-27J	MDAP	Air Force
273	C-5 AMP	C-5 Avionics Modernization Program	MDAP	Air Force
327	C-5 RERP	C-5 Reliability Enhancement and Re-engining Program	MDAP	Air Force
265	F-22	F-22 Advanced Tactical Fighter	MDAP	Air Force
199	FAB-T	Family of Beyond Line-of-Sight Terminals	MDAP	Air Force
237	GBS	Global Broadcast Service	MDAP	Air Force
292	GPS IIIA	Global Positioning Satellite IIIA	MDAP	Air Force
257	HC/MC-130 RECAPITALIZATION	HC/MC-130 Recapitalization Program	MDAP	Air Force
555	JASSM (JASSM/JASSM-ER)	Joint Air-to-Surface Standoff Missile (JASSM and JASSM-Extended Range)	MDAP	Air Force
503	JDAM	Joint Direct Attack Munition	MDAP	Air Force
560	JPATS	Joint Primary Aircraft Training System	MDAP	Air Force
387	KC-46A	KC-46A Tanker Replacement Program	MDAP	Air Force
357	LAIRCM	Large Aircraft Infrared Countermeasures	MDAP	Air Force

Figure 8. MDAP Program List 2011. From (DoD, 2011)

In determining requirements to support the National Military Strategy (NMS) and NSS, the Department of Defense (DoD) uses three major decision-support systems to acquire or modify existing materiel or services to meet its needs. These processes, as shown in Figure 9, work in conjunction with and in parallel to one another to assess the

capability needs, plan and allocate resources, and ultimately acquire the materiel or services needed to execute the operations and missions delegated to the military Services (DoD, 2006).

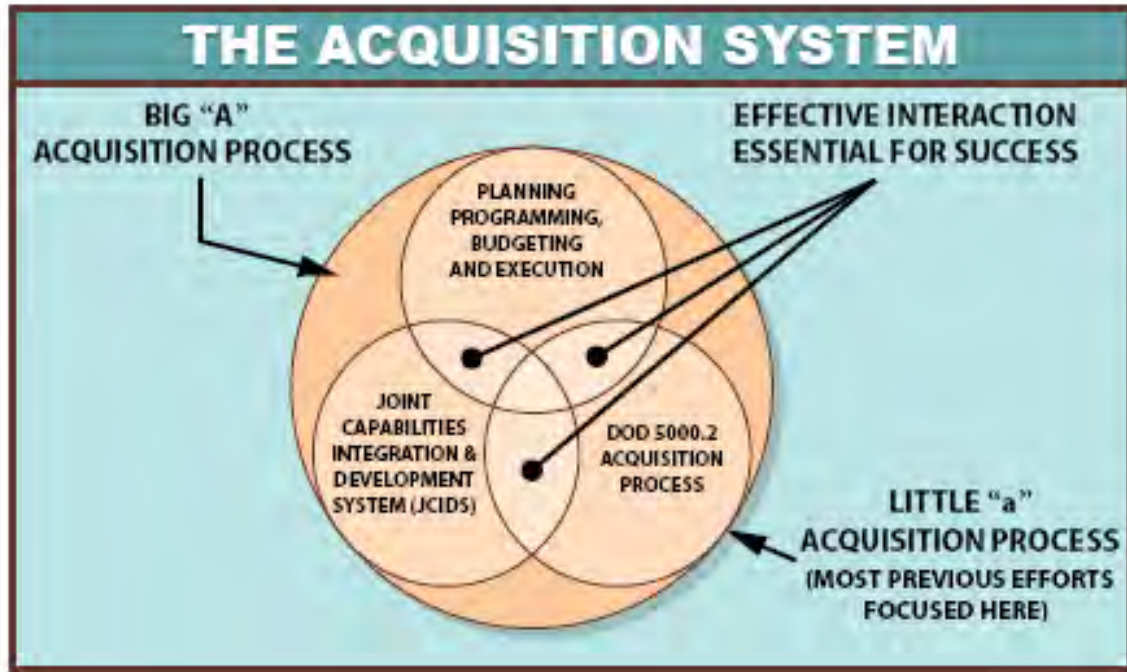


Figure 9. Department of Defense Acquisition System. From (DoD, 2006)

The Defense Acquisition System (DAS) is a “highly complex” framework that consists of various stages, milestone decision points, documentation, and disciplines, all of which revolve around the acquisition of a system or system of systems (CRS, 2010). The main focus of the personnel directly responsible for acquiring the system(s) is to obtain the system(s) at or below cost, while meeting or exceeding schedule and performance requirements within the parameters of the Integrated Defense Acquisition, Technology, and Logistics Life Cycle Management System, as shown in Figure 10.

Defense Acquisition Lifecycle Framework

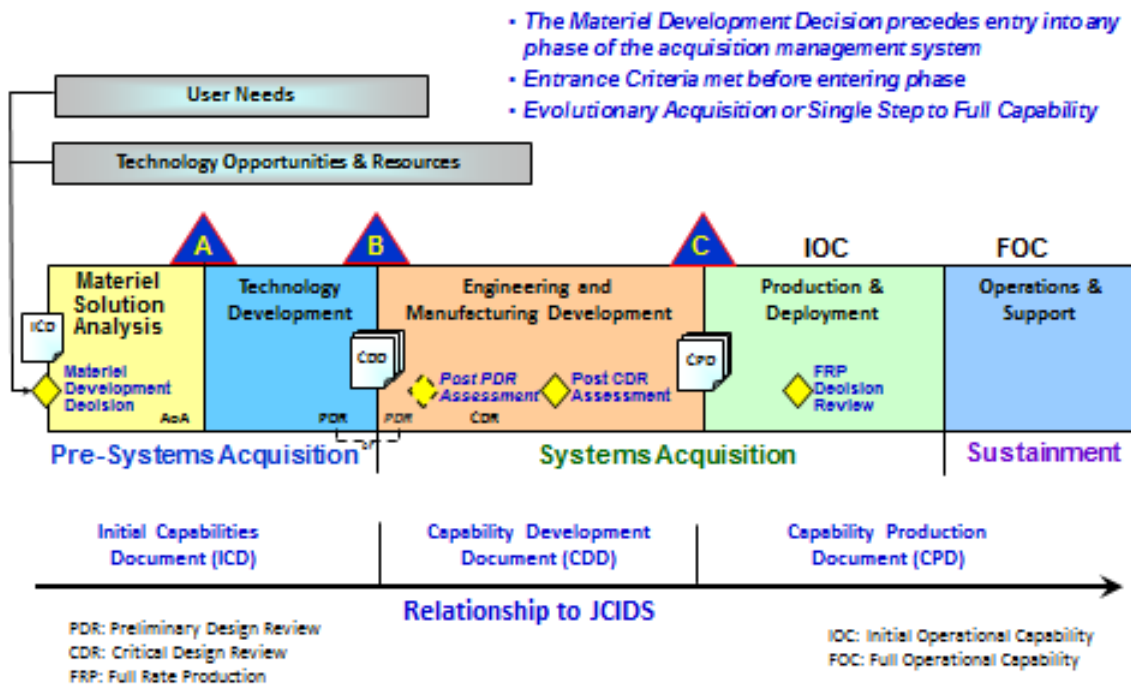


Figure 10. Defense Acquisition Lifecycle Framework. From (DoD, 2010)

Defense system programs (technology or acquisition) are assigned specific Acquisition Category (ACAT) designations according to their size, complexity, and risk and are categorized according to their “location in the acquisition process, dollar value, and [Milestone Decision Authority] MDA special interest” (USD[AT&L], 2008). Each ACAT designation has specific reporting requirements, rules and procedures that must be strictly adhered to in the planning and execution of the program. Acquisition professionals are required to be cognizant of their program’s ACAT designation and how it affects the outcomes of their program in relation to the DAS (USD[AT&L], 2008).

Contracting professionals working in the field of major systems acquisition should become familiar with Department of Defense Directive (DoDD) 5000.01 and DoD Instruction 5000.02. These documents provide the policies, principles, instruction, statutory and regulatory reports and other information necessary to govern and operate

the DAS. In addition to DoDD 5000.01 and DoDI 5000.02, contracting professionals should also be familiar with the Federal Acquisition Regulation, specifically Part 34—Major System Acquisition, Part 35—Research and Development Contracting, Part 39—Acquisition of Information Technology, as well as agency and other applicable guidance and regulations specific to the acquisition strategy and acquisition category of the program (FAR, 2011).

Due to the many facets of systems acquisition that differentiate it in complexity compared to basic procurement, the DoD has directed the establishment of multidisciplinary Integrated Product Teams (IPTs). These teams work together in the DAS with the contractor (and their IPTs) to design, develop and acquire the systems necessary to support the warfighter and meet NMS/NSS objectives. A conceptual model of typical IPTs and team members is presented in Figure 11.

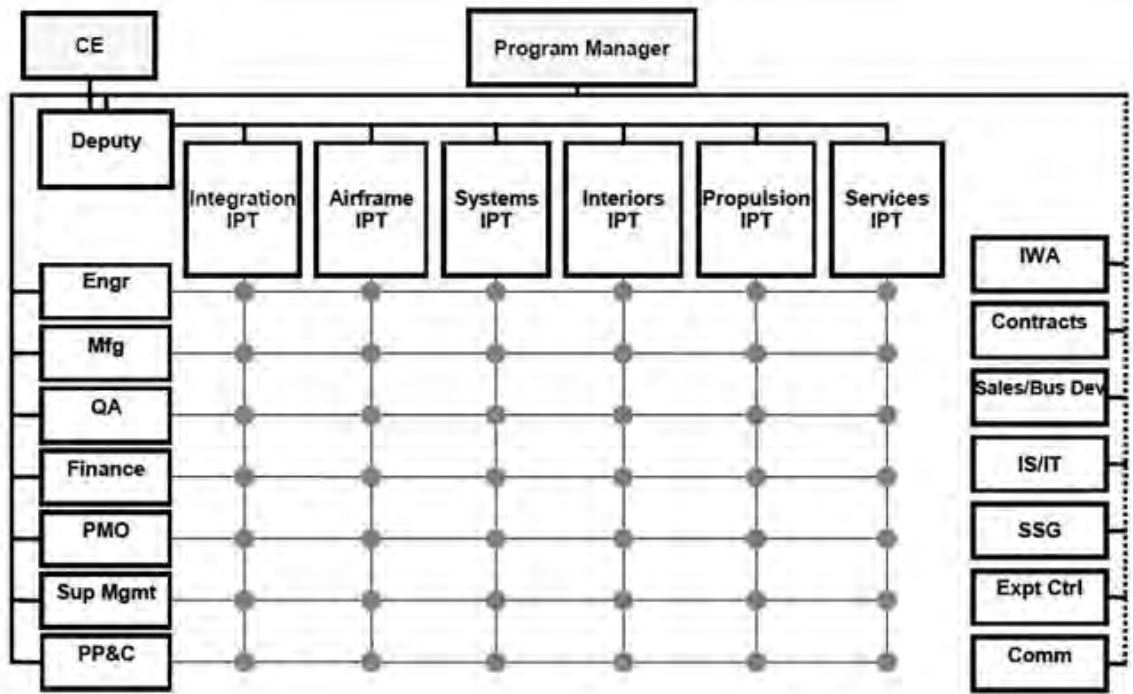


Figure 11. Conceptual Model of Integrated Product Teams. From (DAU, 2010)

Contracting officers and personnel assigned to major systems acquisition are typically part of an IPT, and their role and responsibilities, as applicable to a particular

program, are generally established in the program’s charter. While the contracting officer’s responsibilities will vary depending on the stage or phase of the program’s lifecycle, some general responsibilities, as described by Acquisition Management System (AMS), are shown in Table 4.

Table 4. Contracting Officer Responsibilities in Systems Contracting.
From (FAST, 2002)

Ensures, as applicable, conflict of interest documentation is obtained from all IPT members, and determines, with legal counsel review, if any conflicts of interest exist.
Ensures that IPT members are briefed on the sensitivities of the source selection process, the prohibition against unauthorized disclosure of information (including their responsibility to safeguard proposals and any documentation related to the IPT's proceedings), and the requirements pertaining to conflicts of interest.
Coordinates communications with industry.
Participates during the screening, selection, and debriefing phases of source selection to ensure fair treatment of all offerors.
Issues, as required, solicitation amendments and letters, screening information requests (SIRs), and SIR amendments to industry.
Controls all written documentation issued to industry related to the source selection and contracting process.
Ensures the contract is signed by an official with the authority to bind the company.
With guidance from legal counsel, assures that all contractual documents are in compliance with applicable laws and regulations.
Serves as the Source Selection Official when delegated responsibility by the IPT leader.
Executes, administers, and terminates contracts, and makes related determinations and decisions that are contractually binding.

While this section focused primarily on the acquisition of defense systems, contracting personnel are also needed to support individual base operations, often referred to as operational contracting.

D. OPERATIONAL CONTRACTING

Operational contracting units support the mission of MAJCOMs and individual Air Force installations. Requirements necessary to meet the installation's mission are generated through the installation's units and are fulfilled through the contracting office. The majority of these requirements are day-to-day mission necessities often categorized as commodities, services, or construction. Typical services include custodial, grounds maintenance, and Heating, Ventilation, and Air Conditioning, while commodities range from office supplies to electronic equipment. A wide range of contracting methods, predominately utilizing Simplified Acquisition Procedures, are used to procure the needed requirements while "safeguarding the interests of the United States in its contractual relationships" (FAR 1.602-2, 2011).

Over the past decade, DoD has outsourced many base operations support services that were previously performed "in-house" by uniformed personnel. Examples of the services outsourced include aircraft maintenance, grounds maintenance, janitorial services, and the privatization of military family housing. The result of this outsourcing effort was an increase in both service contract complexity and increased contractor oversight for operational contracting squadrons. More specifically:

These changes include the use of increasingly complex incentive-type service contracts, increased emphasis on the government's quality assurance program, and an increased emphasis on establishing government and contractor partnering relationships. (Rendon, 1998)

This increase in workload requires contracting professionals to have the proper knowledge, skills, and abilities to execute complex requirements.

An operational contracting squadron falls under the direct military authority of the installation command structure; however, contract authority is received through the MAJCOM Chief of Contracting to the contracting squadron commander, and further delegated to the contracting officer. The contracting officer is selected based on careful consideration of the "complexity and dollar value of the acquisitions to be assigned and the candidate's experience, training, education, business acumen, judgment, character, and reputation" (FAR 1.603-2, 2011). Therefore, operational contracting officers have a

particularly complex mission to meet installation requirements while abiding by the applicable statutory requirements, policies, and procedures set forth by the contracting chain of command.

Compared to systems contracting, the dollar value of operational contracts is often only a small percentage. As displayed in Figure 12, according to the FY2011 Air Force Budget Rollout Brief, of the 2010 contracting dollars appropriated, approximately \$42.1B, or 86.6% were for weapon system requirements (including RDT&E), while \$6.5B, or 13.4% were appropriated for installation support. Although the dollar amount is significantly less than systems contracting, the volume of operational contracting actions is significantly more.

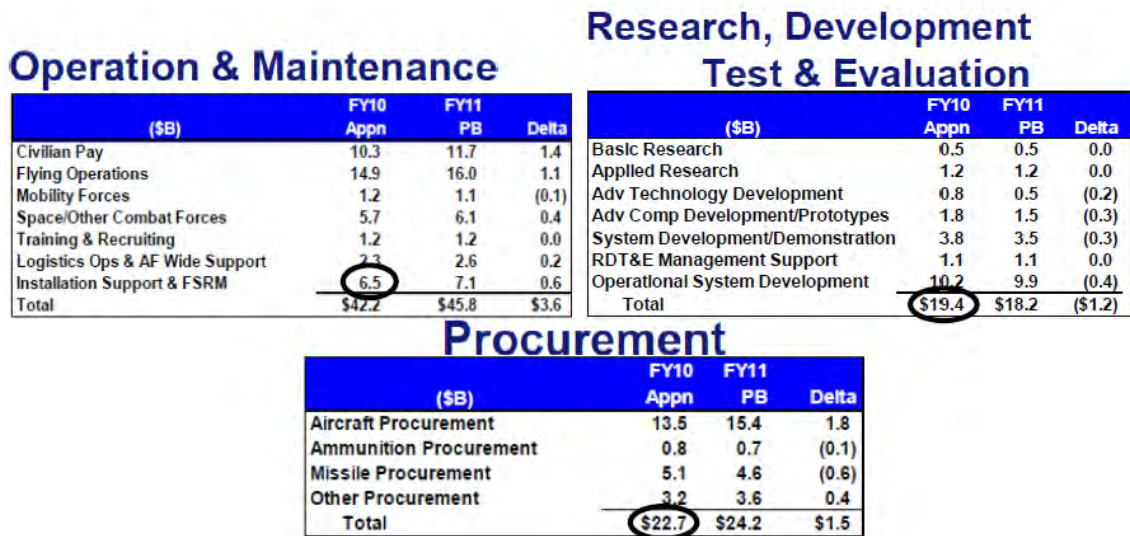


Figure 12. FY2011 Air Force Budget Rollout Brief Charts. From (DAF, 2011)

E. KNOWLEDGE REQUIREMENTS FOR OPERATIONAL AND SYSTEMS CONTRACTING

The knowledge required for systems and operational contracting differ based on the perspective from which they are viewed. Defense Acquisition Workforce Improvement Act (DAWIA), through the Defense Acquisition University (DAU), standardizes the required training across the entire contracting workforce. As is typical

with standardized training, depth and breadth are often compromised in order to provide a more general knowledge. From a practitioner perspective, the standardized contracting training requirements neglect to take into account the differences between systems and operational contracting.

From a DAWIA standpoint, level certification does not differentiate between operational and systems contracting; however, there are some required DAU courses, such as ACQ 101, that focus primarily on systems contracting. For example, all contracting personnel are required to take ACQ 101 for their Level II certification, regardless of what type of contracting they are currently performing.

Although both weapon systems and operational contracting both incorporate the same contracting principles, each one requires additional practitioner knowledge. Specific to weapon systems, contracting is just one piece of a sophisticated process. It is not uncommon for a weapon system to have numerous contracts dispersed throughout several IPTs. Additionally, the contracting arrangements often require more in-depth analysis and understanding into areas such as industrial base strength and capability, incentivizing industry innovation, familiarity with cost type contracts, and knowledge of multi-year contracts. A contracting officer within weapon systems acquisition must have a sound understanding of these factors, and possess the capability to apply sound business judgment within their area of responsibility.

Operational contracting requires knowledge in certain areas not predominately used in weapon systems, specifically services contracting. A 2010 USD(AT&L) memorandum titled “Better Buying Power” states, “contract support services spending now represents more than 50 percent of our total contract spending.” (USD[AT&L], 2010, p. 11) This memorandum lists the five major areas of efficiencies sought in DoD acquisition, of which one is to “improve tradecraft in services acquisition” (USD [AT&L], 2010, p. 11). The memorandum illustrates both the importance of services acquisition and the priority of improving the knowledge and abilities of the contracting workforce in that area.

Services acquisition is a complex and generally re-occurring effort to provide support services for military installations. Contracting Officers performing services acquisitions require working knowledge in areas such as building and refining Performance Work Statements, sufficient knowledge of the Service Contracting Act and its implications on a specific contract's labor force, knowledge of multiple year contracts, and options. In addition to services acquisition, operational contracting officers are expected to execute construction and commodity contracts for installation support. Construction contracts require additional knowledge requirements for performance, payment, and bid bonds, the Davis-Bacon Act, and possible site condition issues and implications. Similar to weapon systems contracting, operational contracting requires a sound understanding of the aforementioned factors, and the capability to apply sound business judgment within the area of responsibility.

F. SUMMARY

In this chapter, the Air Force Contracting organizational framework was presented. Specifically, the research discussed how Air Force contracting policy and procedures originate with SAF/AQC, and subsequently flow through the two primary areas of contracting—weapon system and operational. Although these two areas share the same standardized training and many similar contracting principles, they each require specific knowledge to be effective. The next chapter details the research methods used to gather sample data from the target contracting professionals.

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IV. RESEARCH METHODOLOGY

The purpose of this chapter is to fully explain the procedures and decisions made in creating the Air Force Operational Contracting Knowledge Assessment (OCKA-AF) tool. The chapter begins by detailing how the assessment tool was developed and the individual parts that make up the assessment, followed by a discussion of the target audience for the assessment, and the procedures for collecting the data. Lastly, the chapter describes how the explicit and tacit knowledge data are analyzed, and then summarizes the assessment's limitations and assumptions.

A. ASSESSMENT CONSTRUCTION

The knowledge assessment's primary purpose is to efficiently and accurately determine an individual's operational contracting knowledge. As discussed in the literature review, comprehensive knowledge is made up of two different types of knowledge; these two types are explicit (factual) and tacit (experiential) knowledge. The assessment utilizes demographic and multiple-choice questions designed to follow the model of tacit and explicit knowledge, and consists of three separate sections of questions: demographic, tacit, and explicit.

The assessment is a web-based survey because we believe this to be the most efficient and feasible medium to meet the research objectives, given the sample population is spread out among different locations. Similarly, a multiple-choice assessment is not conducive to using methods such as video teleconference or telephone due to the comparison of possible answer choices. We chose Survey Monkey™.com as the delivery method, with a link to the survey electronically mailed to the target population.

The length of the assessment is based on the objective of trying to get accurate knowledge data while maintaining efficiency (time). In total, the assessment consists of 79 questions. The demographic portion of the survey contains eight questions that form the basis of various comparisons in the data analysis. The next section of the survey is dedicated to tacit knowledge and consists of 14 questions that are multiple-choice in

nature and are directed at determining the individual's contracting experience across the six phases of contracting. The third and final section of the assessment consists of 57 multiple-choice, explicit knowledge questions. Each of the questions is Federal Acquisition Regulation (FAR)-based and fact-oriented, and is used to measure the individual's explicit contracting knowledge.

B. ASSESSMENT VALIDITY

A concern in developing the assessment is validity. Since explicit knowledge questions have correct and incorrect answers, they have the highest propensity for conflict. A source of thoroughly-vetted, FAR-based questions was the target for the assessment. As a professional association, the National Contract Management Association (NCMA) provides and administers professional certifications in the areas of contract management. Specifically, one of NCMA's nationally recognized certifications is the Certified Federal Contracts Manager (CFCM) certification. Award of this certification requires a candidate to possess a certain level of education and experience along with passing a 150 question knowledge test (NCMA, 2011). The questions are multiple-choice and FAR-based. NCMA publishes a study guide, containing a practice test, aimed at preparing CFCM candidates for the certification exam. Since obtaining test questions from the current CFCM exam test bank is not feasible, a request was made and granted to use the CFCM practice test questions in the assessment tool. Once approval was received from NCMA for the use of the CFCM study guide practice test questions, a majority of the questions were incorporated into the explicit knowledge section of the knowledge assessment.

The Department of Defense (DoD) Contracting Competency Model (CCM) developed in March 2007 "defines behaviors and underlying knowledge, skills, and abilities required for superior job performance for the contracting workforce" (Manning et al., 2008, p. 44). The foundation for the model was the gathering of information "from contracting functional leaders and 377 subject matter experts from across the contracting career field" (Manning et al., 2008, p. 45). After a thorough and exhaustive vetting process involving possible competency candidates, the model was finally completed. It

resulted in “11 units of competence, 28 technical competencies, 10 professional competencies, and 52 final elements with supporting knowledge” (Manning et al., 2008, p. 46). The 28 technical competencies are of importance to the research because they identify what is important in developing contracting professionals. Since contingency contracting is not in the scope of the knowledge assessment, only the first 27 competencies are considered in this project. The tacit knowledge questions are validated by aligning them to Garrett and Rendon’s (2005) six phases of contracting, which contain the competencies identified in the CCM.

The Contract Management Maturity Model (CMMM©) is a framework developed by Rendon to assess the maturity of an organization’s contract management processes (Garrett & Rendon, 2005). The CMMM© divides the contracting process into six separate and distinct phases. It is conducive to the research because each of the competencies identified in the DoD CCM are attributable to one or more of the six phases. Additionally, measuring six areas vice 27 competencies is a much more feasible approach given the scope of the research.

C. ASSESSMENT CONTENTS

1. Section I–Demographic Questions

The demographic questions provide a basis of comparison among the respondents. Although the assessment tool can provide the knowledge data for an individual without any of the demographic questions, there is great value to having groups upon which to make comparisons and analyze potential knowledge gaps. For example, an officer attending the Naval Postgraduate School with four years of contracting experience could complete the assessment and see a visual representation of his overall contracting knowledge. But how does he compare to his peers? In what phases of contracting does he have more or less experience as compared to his peers? Are there any significant trends in the aggregate results of his peer group? How is his knowledge (both explicit and tacit) different from an enlisted contracting professional with the same number of years of experience? Demographic-based questions may provide the answers to some of these important questions.

The eight demographic questions used in the assessment are primarily contracting and employment status related. Contracting related questions refer to things such as warrant authority, years of contracting experience, Acquisition Professional Development Program (APDP) level, and unit training. Employment status questions refer to type of service—civilian, officer, or enlisted. All chosen questions represent those that provide the greatest benefit to the research without causing unnecessary risk to the research subjects. Since the focus of the research is on general contracting knowledge, items such as gender and race are not required for consideration and are excluded from the assessment.

2. Section II—Tacit Knowledge Questions

The tacit knowledge questions were developed to determine the individual's experience as it pertains to each of the six phases of contracting (Garrett & Rendon, 2005). As a guide, the research used a matrix developed by Rendon (2011) that identifies which FAR Parts are generally applicable to each of the six phases of contracting. We followed a standard process in developing questions for each section of the test. First, we identify which of the six phases they would address. Once the phase is identified, Rendon's matrix provides the FAR Part related to that particular phase. The FAR Parts are then reviewed, and a relevant question is developed and vetted through the research project advisors.

Although all of the questions are multiple-choice, Likert scale multiple-choice questions are used whenever possible to enable detailed comparisons between multiple pieces of data and to aid in quantifying knowledge results. For example, a “yes-or-no” type question provides two points of comparison while a Likert scale multiple-choice type question provides numerous points of comparison. Further, by using a Likert scale, progressive weights can be added for particular answers, which is very beneficial when determining values for an individual's experience levels in the different phases of contracting. There are two versions of the Likert scale used in the tacit section of the assessment. The first and most widely-used version is as follows:

- NONE—I do not possess proficiency in the competency

- BASIC—I am capable of handling the simplest of assignments involving this competency, but need significant assistance beyond the easiest solutions
- INTERMEDIATE—I am capable of handling many day-to-day assignments involving this competency, but may seek assistance in difficult or new situations.
- EXPERT—I am capable of handling all assignments involving this competency and may serve as a role model and/or coach to others.

The second version of the Likert scale is used for one question regarding market research. The purpose of the question is to determine the complexity of the requirements to which the individual has prior exposure. Specifically, it is expected to provide insight into the level of procurement planning, solicitation planning, and solicitation building effort necessary for the requirement.

- NONE—Does not influence the structure and/or contract type for the requirements that I work.
- LIMITED—Rarely influences the structure and/or contract type for the requirements that I work.
- MODERATELY—Frequently influences the structure and/or contract type for the requirements that I work.
- EXTENSIVELY—Always influences the structure and/or contract type for the requirements that I work.

The tacit knowledge questions utilizing Likert scales are weighted in order to provide meaningful performance results. If the information were not weighted, an individual having BASIC experience would receive the same tacit (experience) score of someone rated as EXPERT. Since this would obviously provide inaccurate data, we use an equally distributed weighting process that considers the number of tacit knowledge questions in each of the six phases.

3. Section III—Explicit Knowledge Questions

The assessment uses 57 explicit knowledge questions to determine an individual's factual, FAR-based knowledge. This section is the most time consuming of the assessment since each question's possible answers must be considered prior to answer

selection. Each question is multiple-choice with four possible answers, and is taken directly from the CFCM study guide practice test. Permission from NCMA to use the questions was requested and granted.

Selecting assessment questions from the pool of practice test candidates is a very intense and deliberate process. The foundation of the selection process resides in the six phases of contracting as identified by Rendon in the CMMM©. The six phases, in order, are: Procurement Planning, Solicitation Planning, Solicitation, Source Selection, Contract Administration, and Closeout (Garrett & Rendon, 2005). Each of the possible candidate questions are initially assigned to a single phase of the process. This proved time consuming because some contracting functions and decisions are fragmented and can overlap from one phase into another. For example, some FAR requirements may apply to both the solicitation planning and solicitation phases of the contracting process. The result is the assignation of some questions to multiple phases of the contracting process.

Once the candidate questions are assigned to their respective phase(s), they are vetted for overall applicability. Questions deemed both relevant and applicable remain in the candidate pool while all others are removed from consideration. Next, we use subjective judgment, based on our collective knowledge and experience, to remove questions that are not related to the primary population of operational contracting personnel. For example, questions more closely related to systems contracting are excluded. The remaining questions in each of the phases were determined equally relevant and applicable to operational contracting. All questions removed from the candidate pool after this point was done indiscriminately and for the sole purpose of reducing the number of questions to make the assessment less time consuming.

Ensuring an adequate number of questions for each of the six phases, while continuing to provide an effective measure of knowledge, is another consideration for the research. We consulted with the research advisors to reach agreement on the appropriate number of questions. The final distribution of explicit knowledge questions, by phase, is shown in Table 5. Next, the decision of explicit questions scoring or weighting is addressed. We decide against weighting the questions in this section for two reasons. First, the CFCM study guide practice test questions are not weighted by difficulty, and it

is outside the scope of the research to effectively accomplish this. Second, weighting a question with only one correct answer is not a feasible scoring method.

Table 5. OCKA-AF Question Distribution

	Procurement Planning	Solicitation Planning	Solicitation	Source Selection	Contract Administration	Closeout
Demographic	N/A	N/A	N/A	N/A	N/A	N/A
Tacit	3	4	4	4	3	4
Explicit	11	29	28	30	16	3

D. ASSESSMENT POPULATION

The target population for the knowledge assessment is Air Force contracting personnel who have performed contracting duties at the operational level. The scope of this research is limited to surveying two operational contracting squadrons and Air Force contracting personnel currently completing the Master of Business Administration (MBA), Contract Management curriculum, at NPS. Although the research could include other sample population groups, the decision to limit the scope of the sample population was based on time limitations of the research project and survey limitations imposed by the Air Force.

We identified two Air Force contracting squadrons as a source to gather assessment data due to their large contracting population and current operational support mission. The larger population provides more data, which allows a more thorough knowledge gap analysis. A prerequisite for sample population consideration is an operational contracting mission, since the primary objective of the assessment tool is to measure operational contracting knowledge.

As of June 1, 2011, there were twenty-two Air Force company grade contracting officers attending NPS, with nine more expected in July 2011. Together, these two NPS student subgroups form the second target group for the assessment tool. Unlike the squadrons, this group is not currently serving in an operational contracting environment.

Since contracting officers' first duty assignments are predominately operational tours, they have the requisite operational background the research is attempting to target.

E. DATA COLLECTION PROCEDURE

Data collection for the squadrons is initiated by sending the web-based assessment link to the respective squadron commanders. The squadron commanders subsequently provide the assessment link to their military and civilian personnel. Administration of the survey is accomplished using the research advisor's Survey Monkey™ account. Using this particular online survey method allows us to obtain the required data, while providing reassurance to the individuals that their responses are anonymous.

The method for data collection from the NPS group is nearly identical to that of the contracting squadrons. A request for survey dissemination is sent to the research advisor. The advisor then sends the survey to the Air Force MBA Contract Management specialization curriculum students via e-mail. After the survey is completed, anonymity is maintained in the same manner as with the contracting squadrons.

The survey period was limited to four weeks. This should provide sufficient time for the squadrons and students to complete the survey while still allowing them time to fulfill daily mission requirements. Additionally, the squadrons are very limited in available time beginning in July due to end of fiscal year contracting requirements. The timing of the distribution of the survey near the end of the month of June was deliberate in order to increase the survey response rate. NPS students are between academic quarters resulting in a reduced academic workload.

Once completed, all data is compiled automatically through Survey Monkey™. The Excel spreadsheet download function is the primary Survey Monkey™ output used for the research. Once the data are downloaded, they are incorporated into a different spreadsheet for scoring and in-depth analysis.

F. LIMITATIONS OF ASSESSMENT TOOL

We identified several limitations of the assessment tool. Each limitation is acknowledged and discussed in the remainder of this section.

Selection of the assessment questions in each phase is accomplished subjectively. Although the questions are vetted through the research advisors, no scientific method or procedure is used to make the final determination of which questions are included in the assessment tool.

The number of questions allocated to each phase of the contracting process is based on the researchers' and research advisor's judgment. Some phases contain more questions than other phases, which could potentially impact the accuracy of knowledge levels.

Generalizations during the analysis are based on the results from three groups taking the assessment. Due to time constraints, the survey populations are adequate for the initial distribution of the assessment tool. If the survey population is increased, the resulting data may provide a more accurate representation of knowledge levels.

Although linked to the six phases of contracting, the tacit knowledge (experience) questions are subjective. Due to the importance of overall assessment length, we had to make decisions on which experience questions would provide the most useful and accurate data. If the number of tacit knowledge questions is increased, the accuracy of the data would also increase.

Although the assessment contains a question regarding CFCM preparation, some Naval Postgraduate School students have taken a directed study course which could skew the results. Since the explicit knowledge questions are taken from the CFCM study guide practice test, the explicit knowledge section of the assessment would be affected.

The weights assigned to the Likert scale are based on an even distribution, which may or may not provide the most accurate scaling. If the questions are scaled based on an increasing level of experience depth, accuracy of the results may improve.

The overall number of tacit questions compared to the number of explicit questions is based on our subjective judgment. The uneven distribution of questions places more weight on one type of knowledge question than it does on the other.

G. SUMMARY

This chapter discussed the development and analysis process of the operational contracting knowledge assessment. Construction and validity were the first areas addressed, followed by a detailed exploration of the assessment sections and targeted population. Once the population was identified, the chapter continued by examining the data collection and analysis techniques used in the research. Finally, a list of assumptions and limitations of the research was presented. In the next chapter, the survey results are presented and analyzed, along with recommendations for closing any gaps between explicit and tacit knowledge.

V. RESEARCH RESULTS

This chapter presents the findings and analysis of the research survey data along with recommendations to close any potential contracting knowledge gaps. First, the overall research response, along with issues encountered while administering the survey are discussed. Next, we present the findings of each survey section within the major demographic categories. Once all findings are discussed, we perform a gap analysis on each major demographic category, and discuss possible reasons for any gap. Finally, recommendations are made to address any major knowledge gaps identified in the analysis.

A. SURVEY RESPONSE

The initial release date of the research survey to eligible respondents was June 29, 2011. Once distributed, results of the survey were accepted through August 19, 2011, bringing the total length of acceptable survey response time to 52 days. As discussed in the research methodology, the survey was presented to 181 eligible contracting personnel, to include military officers and enlisted as well as government civilians. Of the eligible pool, 80 individuals consented to take the survey, and two declined. Of the 80 who consented, 45 actually completed the knowledge survey. Based on the requirements of the research, only those surveys that were completed are included for analysis. Overall, the completed survey response rate was 24.9%.

We encountered several issues in conducting the survey. Although we attempted to act judiciously in the deployment of the survey and allow potential respondents adequate time to respond, we reasonably assumed the following factors may have contributed to eligible respondents ignoring, declining or not completing the survey:

- Workload (existing or impending increased workload due to end of fiscal year (EOFY) requirements)
- Lack of interest (the survey was completely voluntary)
- Absence (due to deployment, temporary duties, illness, or personal reasons)
- Fear of attribution

B. FINDINGS

1. Results by Career Series

Figure 13 provides a breakout of responses by the career series of the respondents. Of the 45 complete responses received, 19 respondents were civilians, 20 respondents were officers, and six respondents were enlisted members. The responses for each of these career series are presented in the subsequent sections.

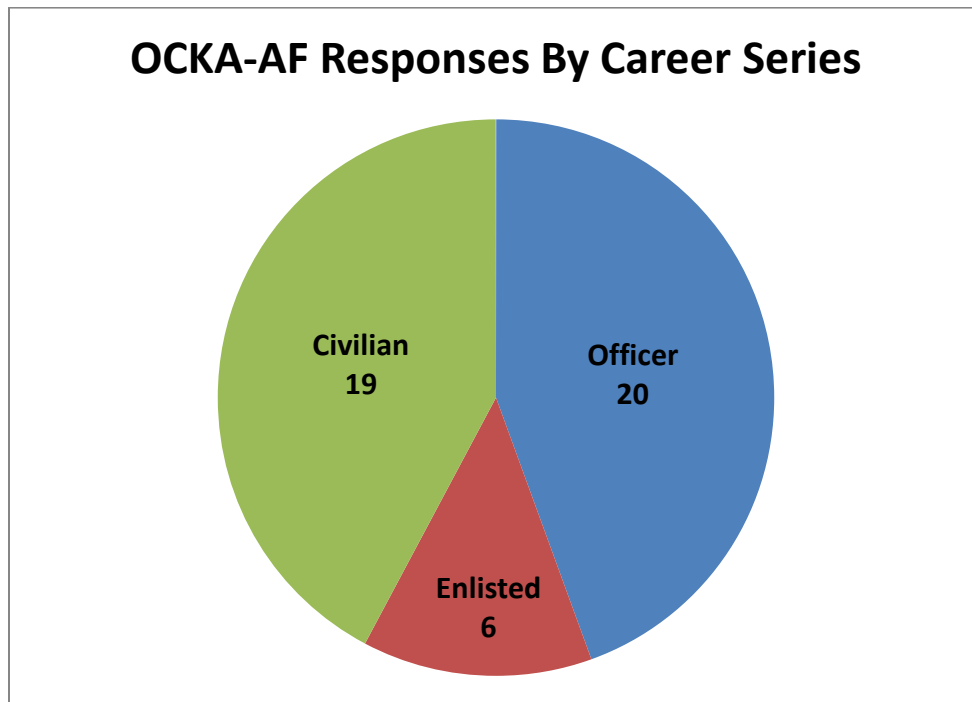


Figure 13. OCCA-AF Responses by Career Series

a. *Officer*

There were a total of 20 Air Force active duty military officers, currently working in the contracting career field, who completed the survey. The experience (determined by years) and training (determined by the Defense Acquisition Workforce Improvement Act (DAWIA) certification levels) of each officer vary.

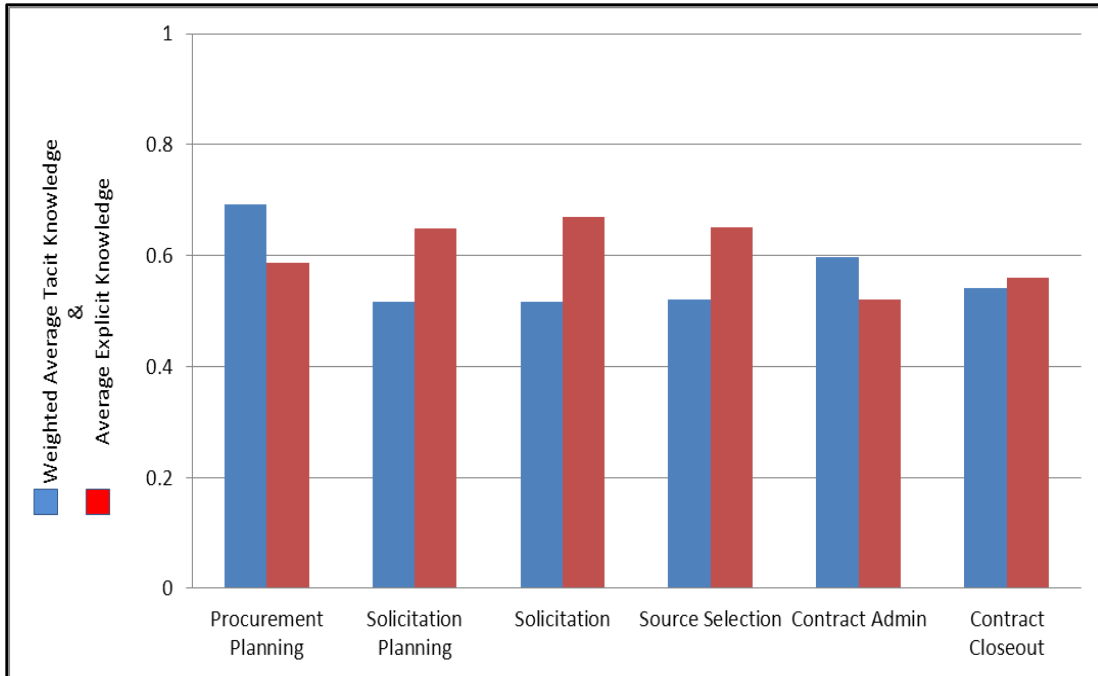


Figure 14. OCKA-AF Officer Survey Results

Figure 14 represents the tacit and explicit knowledge survey results of Air Force officers according to the six phases of contracting. Concerning the tacit knowledge results, the officers who completed the survey scored significantly higher in the Procurement Planning and Contract Administration phases. The highest scores in the explicit knowledge area for the officer respondents were Solicitation Planning, Solicitation, and Source Selection. The overall results show that explicit knowledge exceeds tacit knowledge in four of the six phases.

b. Enlisted

There were six active duty Air Force enlisted, currently working in the contracting career field, which completed the survey. This number represents enlisted members with various levels of experience (determined by years) and training (determined by DAWIA certification levels).

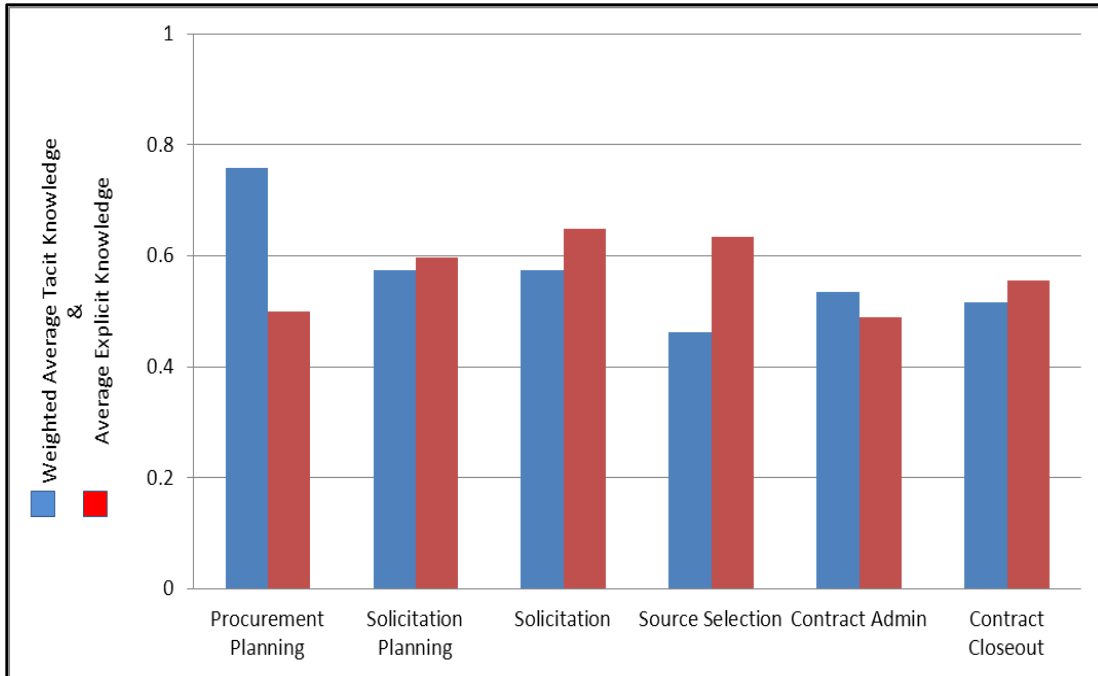


Figure 15. OCKA-AF Enlisted Survey Results

Figure 15 represents the tacit and explicit knowledge survey results for Air Force enlisted members in contracting. Although tacit knowledge is higher than explicit in both Contract Administration and Procurement Planning, the difference in Procurement Planning for this category is significantly greater than all other phases. In regards to explicit knowledge, the Solicitation Planning, Solicitation, Source Selection, and Closeout phases exceed tacit levels in each respective phase. Of the categories where explicit is greater than tacit, Source Selection is the most prominent. Overall, similar to the officer category, explicit knowledge exceeds tacit knowledge in Solicitation Planning, Solicitation, Source Selection, and Contract Closeout.

c. Civilian

There were 19 Department of the Air Force civilian employees, currently working in the contracting career field, who completed the survey. These civilian employees have various levels of experience (determined by years) and training (determined by DAWIA certification levels).

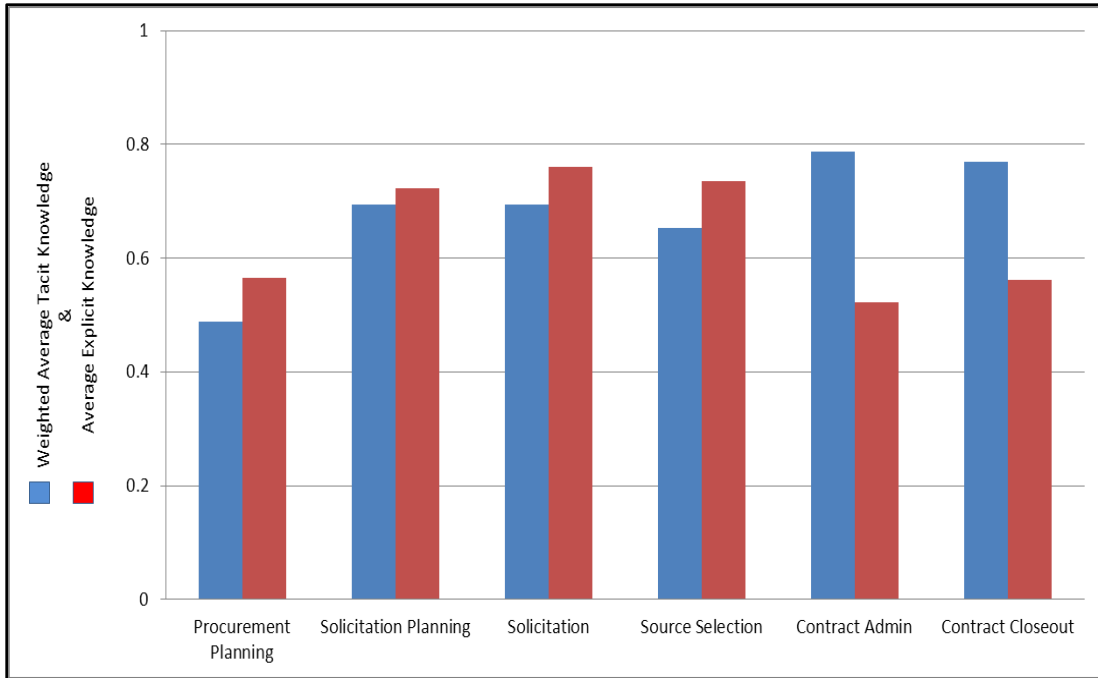


Figure 16. OCKA-AF Civilian Survey Results

Figure 16 represents the tacit and explicit knowledge survey results for civilians in contracting, differentiated by the six phases of contracting. Tacit knowledge levels in this category significantly exceeded explicit knowledge levels in the Contract Administration and Contract Closeout phases. Explicit knowledge is greater in the Procurement Planning, Solicitation Planning, Solicitation, and Source Selection phases. Similar to the officer and enlisted categories, the highest scores in explicit knowledge are evident in Solicitation Planning, Solicitation, and Source Selection. Overall, explicit knowledge levels exceed tacit knowledge levels in four of the six phases.

2. Results by DAWIA Level

Figure 17 shows the breakout of the completed responses received by respondents DAWIA contracting certification level. Of the 45 completed responses received, three respondents held no DAWIA contracting certification, 10 respondents held DAWIA Level I contracting certification, 13 respondents held DAWIA Level II contracting certification, and 19 held DAWIA Level III contracting certification. Data pertaining to the differing certification levels of the respondents are presented in subsequent sections.

Since DAWIA certifications are career specific and consider years of experience and training of the individual, this category of demographics includes all the career series and years of experience of the survey respondents.

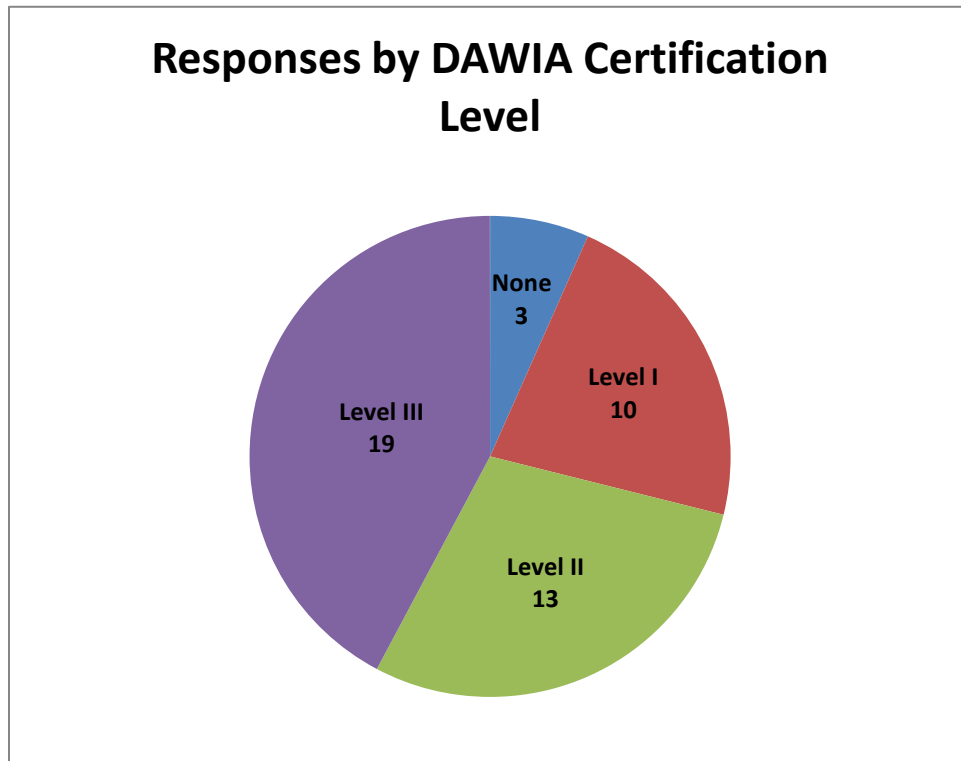


Figure 17. Responses by DAWIA Certification Level

a. Non-DAWIA Level Certified

Of the total number of survey respondents who completed the survey, three identified themselves as possessing no DAWIA contracting certifications. These respondents are included across all areas of the demographics surveyed, such as career series and years of experience. The results are displayed in Figure 18.

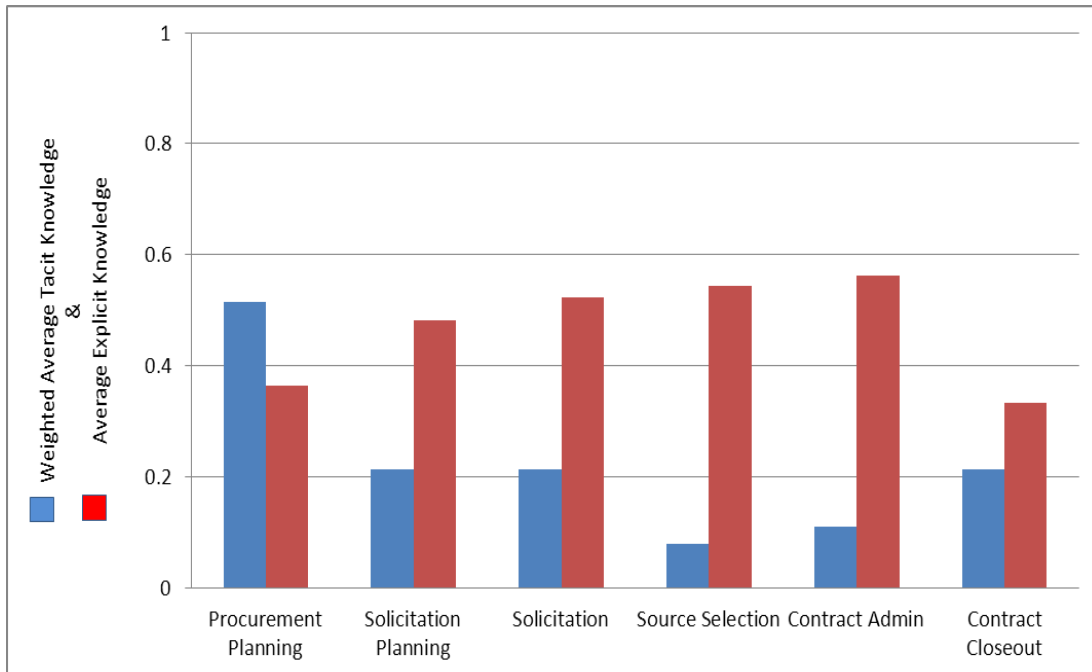


Figure 18. Non-DAWIA Level Certified

For respondents within this demographic claiming to have no DAWIA certification, explicit knowledge in all but one phase, Procurement Planning, eclipses that of tacit knowledge. For the majority of the phases in this category, tacit knowledge appears very low. Overall, explicit knowledge exceeded tacit knowledge in all phases except Procurement Planning.

b. DAWIA Level I Certified

There were a total of 10 respondents who identified themselves as Level I DAWIA certified. These 10 respondents are included across all areas of the demographics surveyed, such as career series and years of experience. The assessment results are depicted in Figure 19.

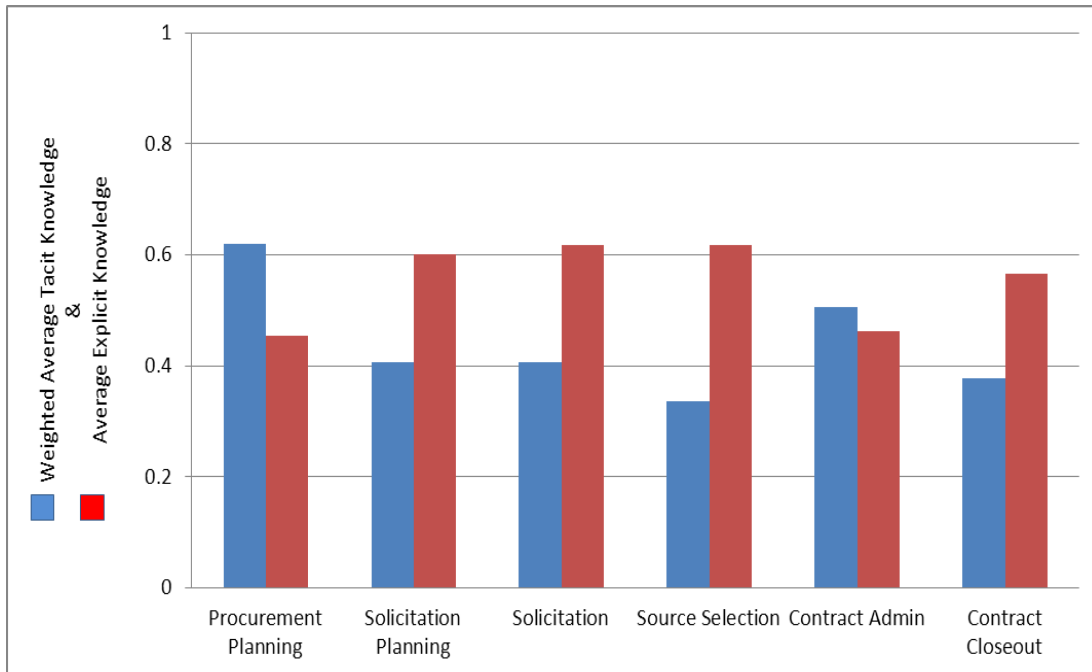


Figure 19. DAWIA Level I Certified

For respondents who identified themselves as having DAWIA Level I contracting certification, explicit knowledge is substantially greater in Solicitation Planning, Solicitation, Source Selection, and Contract Closeout. Of these four phases, Solicitation and Source Selection have the highest explicit knowledge scores. Tacit knowledge appears the highest in Procurement Planning and Contract Administration, with the greatest delta in Procurement Planning. Overall, explicit knowledge exceeds tacit knowledge in four of the six phases.

c. DAWIA Level II Certified

Of the total number of survey respondents who completed the survey, 13 identified themselves as Level II DAWIA certified. These respondents are included across all areas of the demographics surveyed, such as career series and years of experience. Their results are illustrated in Figure 20.

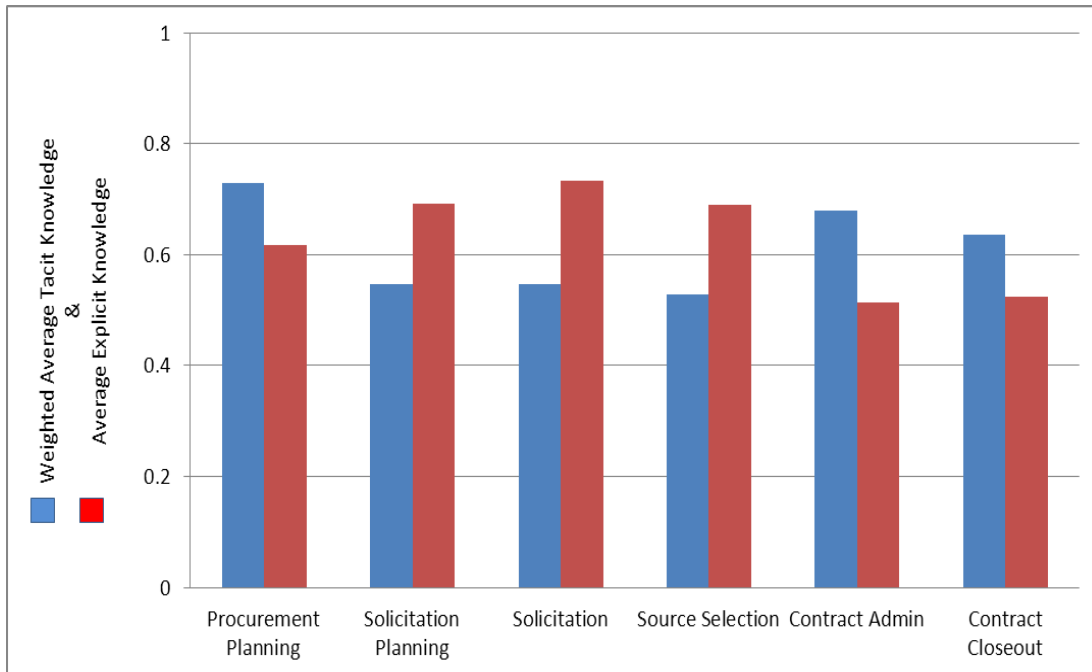


Figure 20. DAWIA Level II Certified

Respondents with DAWIA Level II contracting certification showed a significant increase in all phases of contracting in both explicit and tacit knowledge. Most notably, there were substantial increases in tacit knowledge for all phases of contracting when compared against those respondents with no or initial DAWIA certification. Tacit knowledge is highest in Procurement Planning, Contract Administration, and Contract Closeout, while explicit knowledge is highest in Solicitation Planning, Solicitation, and Source Selection. Overall, explicit knowledge exceeds tacit knowledge in three of the six phases.

d. DAWIA Level III Certified

There were a total of 19 respondents who identified themselves as Level III DAWIA certified. These 19 respondents span across all areas of the demographics surveyed, such as career series and years of experience. Their results are shown in Figure 21.

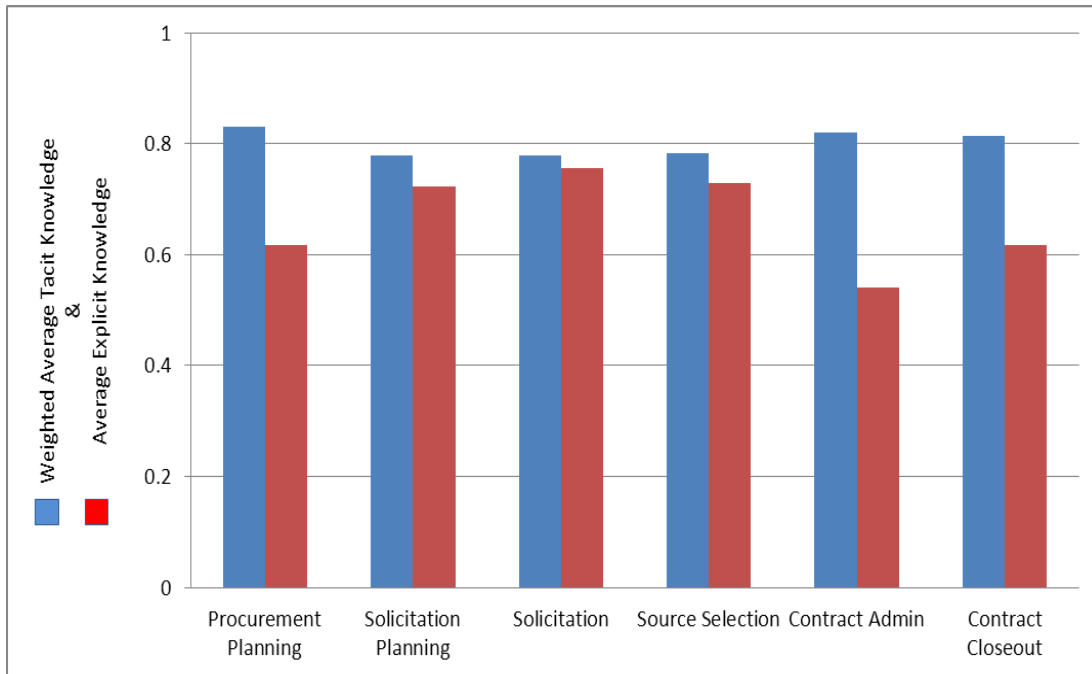


Figure 21. DAWIA Level III Certified

Respondents with DAWIA Level III contracting certification have higher tacit knowledge levels in all phases of contracting. The largest knowledge gaps are in the Procurement Planning, Contract Administration, and Contract Closeout Phases. Although tacit knowledge exceeds explicit knowledge in every phase, overall tacit and explicit knowledge levels are high.

3. Results by Years of Experience

Figure 22 displays the number of responses categorized by years of contracting experience. Of the 45 complete responses received, eight respondents had 0–2 years of experience, nine respondents had 2–4 years of experience, two respondents had 4–6 years of experience, and 26 respondents had six or more years of experience. The responses for each of these experience categories are presented in the subsequent sections.

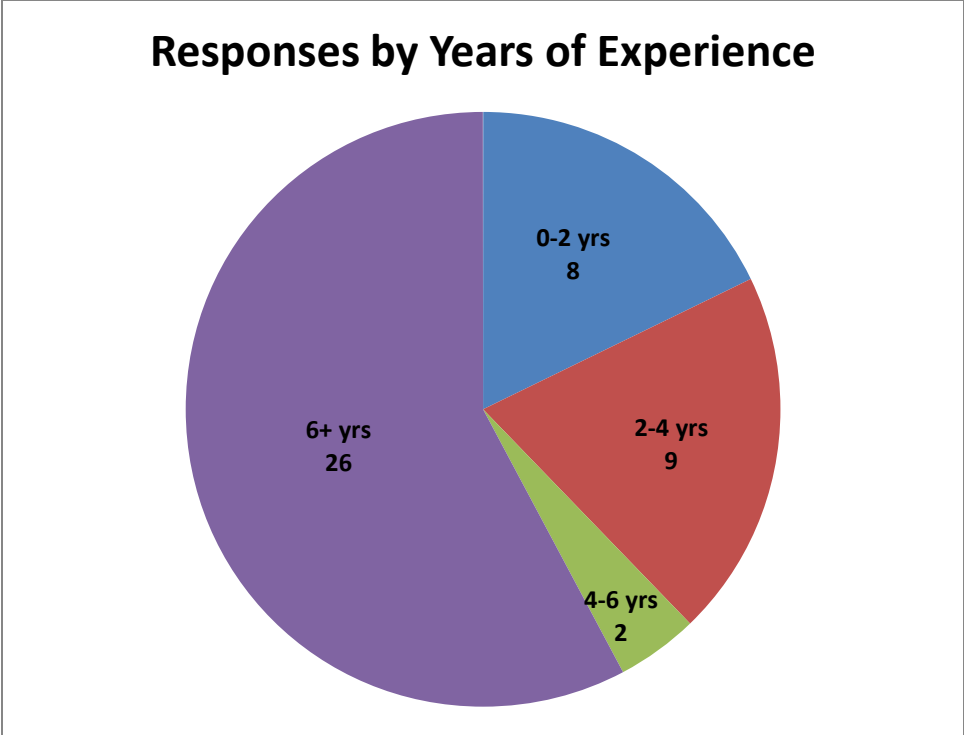


Figure 22. Responses by Years of Experience

a. Respondents with 0–2 Years of Experience

There were eight survey respondents who identified themselves as having between 0–2 years of contracting experience. This number represents years of contracting experience across the different career series with varying education (certification) levels.

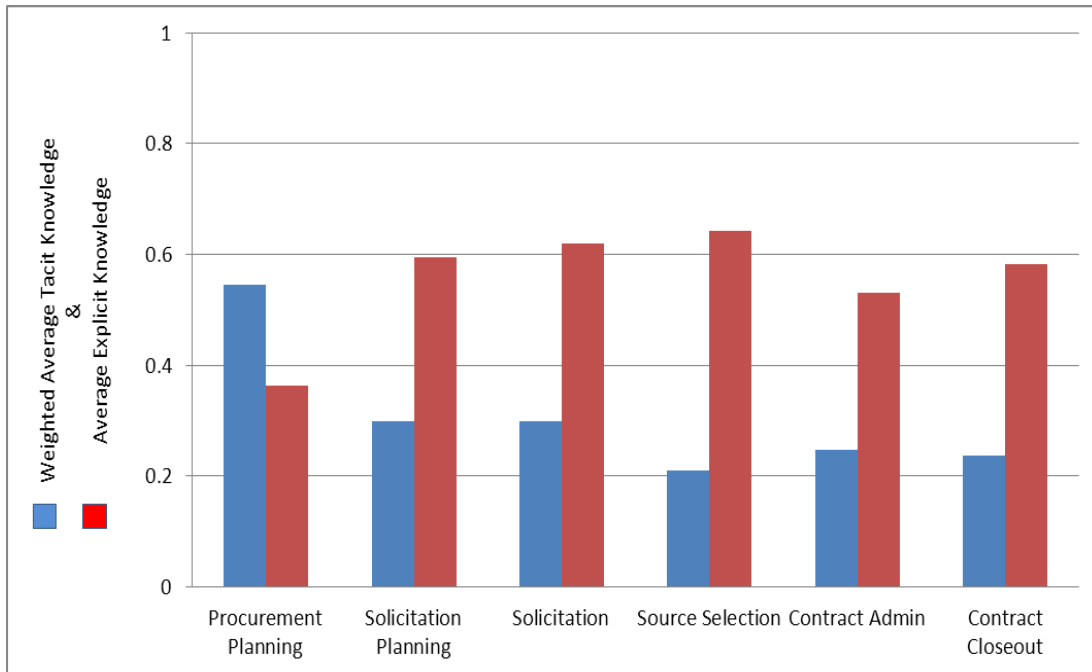


Figure 23. Respondents with 0–2 Years of Experience

Figure 23 represents the tacit and explicit knowledge survey results for respondents with 0–2 years of contracting experience, differentiated by the six phases of contracting. Unsurprisingly, explicit knowledge levels significantly exceeded tacit knowledge in all phases except Procurement Planning. The largest tacit-explicit knowledge gap appears in the Source Selection phase, with the Contract Closeout and Solicitation phases only slightly behind. Overall, explicit knowledge exceeds tacit knowledge in five of the six phases.

b. Respondents with 2–4 Years of Experience

There were nine survey respondents who identified themselves as having between 2–4 years of contracting experience. This number represents years of contracting experience across the different career series with varying education (certification) levels.

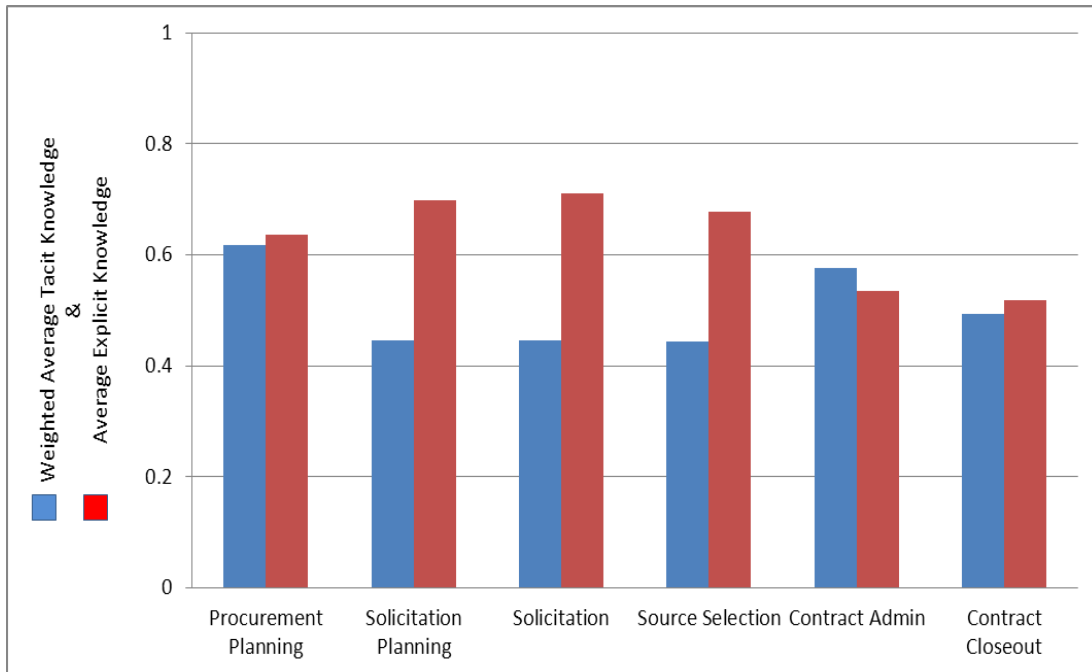


Figure 24. Respondents with 2–4 Years of Experience

As shown in Figure 24, respondents with 2–4 years of contracting experience generally have more explicit than tacit contracting knowledge. In addition, all levels of tacit knowledge have increased significantly over those respondents with 0–2 years of experience. Explicit knowledge levels exceed tacit knowledge levels in all phases except Contract Administration. While Solicitation Planning, Solicitation, and Source Selection have large gaps, Procurement Planning, Contract Administration, and Contract Closeout have small gaps. Overall, explicit knowledge exceeds tacit knowledge in five of the six phases.

c. Respondents with 4–6 Years of Experience

There were two survey respondents who identified themselves as having between 4–6 years of contracting experience. This number represents years of contracting experience across the different career series with varying education (certification) levels.

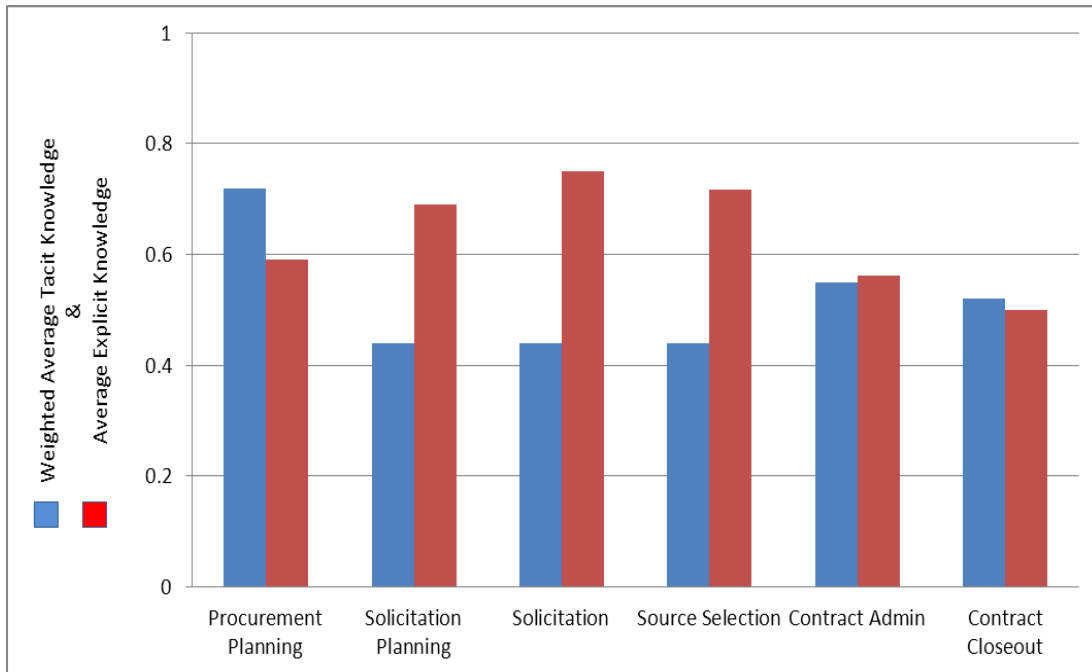


Figure 25. Respondents with 4–6 Years of Experience

As illustrated in Figure 25, respondents with 4–6 years of contracting experience have more explicit than tacit contracting knowledge in each phase except for Procurement Planning and Contract Closeout. Similar to respondents with 2–4 years of experience, the largest gaps appear in Solicitation Planning, Solicitation, and Source Selection. Overall, explicit knowledge exceeds tacit knowledge in four of the six phases.

d. Respondents with Six or More Years of Experience

There were 26 survey respondents who identified themselves as having between six or more years of contracting experience. This number represents years of contracting experience across the different career series with varying education (certification) levels.

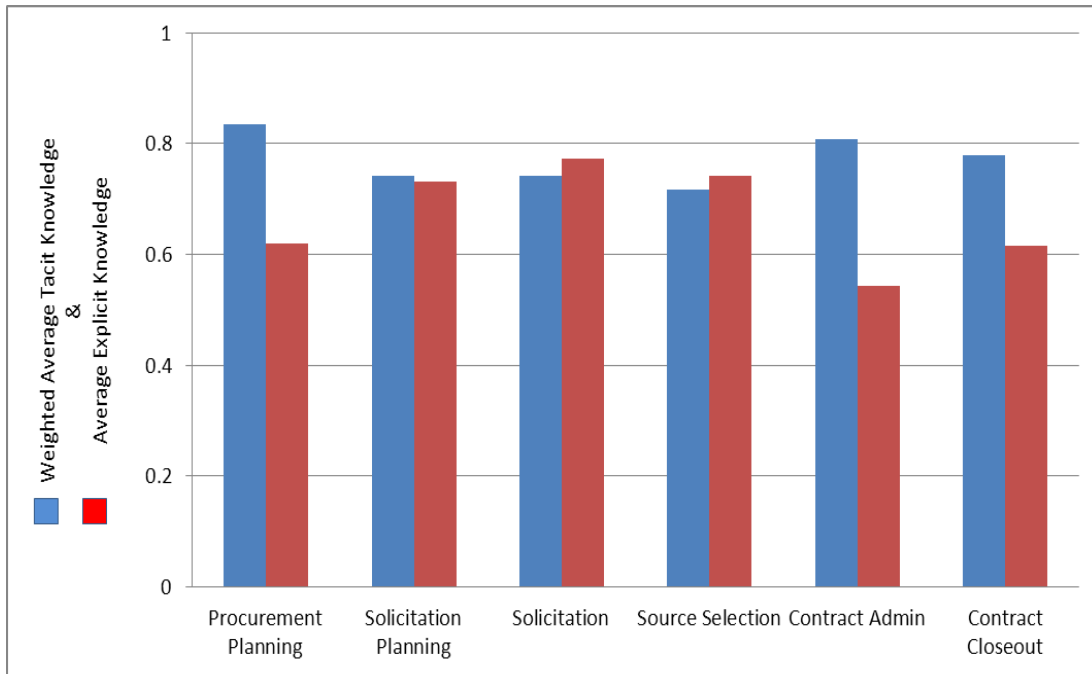


Figure 26. Respondents with Six or More Years of Experience

As shown in Figure 26, respondents with six or more years of contracting experience have higher tacit contracting knowledge levels in each phase with the exception of Solicitation and Source Selection. The largest knowledge gaps appear in Procurement Planning and Contract Administration. Overall, tacit knowledge levels exceed explicit knowledge levels in four of the six phases.

4. Aggregate Career Field Knowledge

Figure 27 represents the aggregate tacit and explicit knowledge across the six phases of contracting for all 45 complete responses received. More specifically, the data reflects the average tacit and explicit knowledge levels across all survey demographics and phases. In the aggregate data, explicit knowledge exceeds tacit knowledge in the Solicitation Planning, Solicitation, and Source Selection phases, whereas, tacit knowledge levels exceed explicit knowledge levels in the Procurement Planning, Contract Administration, and Contract Close-out phases. The three largest knowledge gaps are apparent in the Procurement Planning, Source Selection, and Solicitation phases.

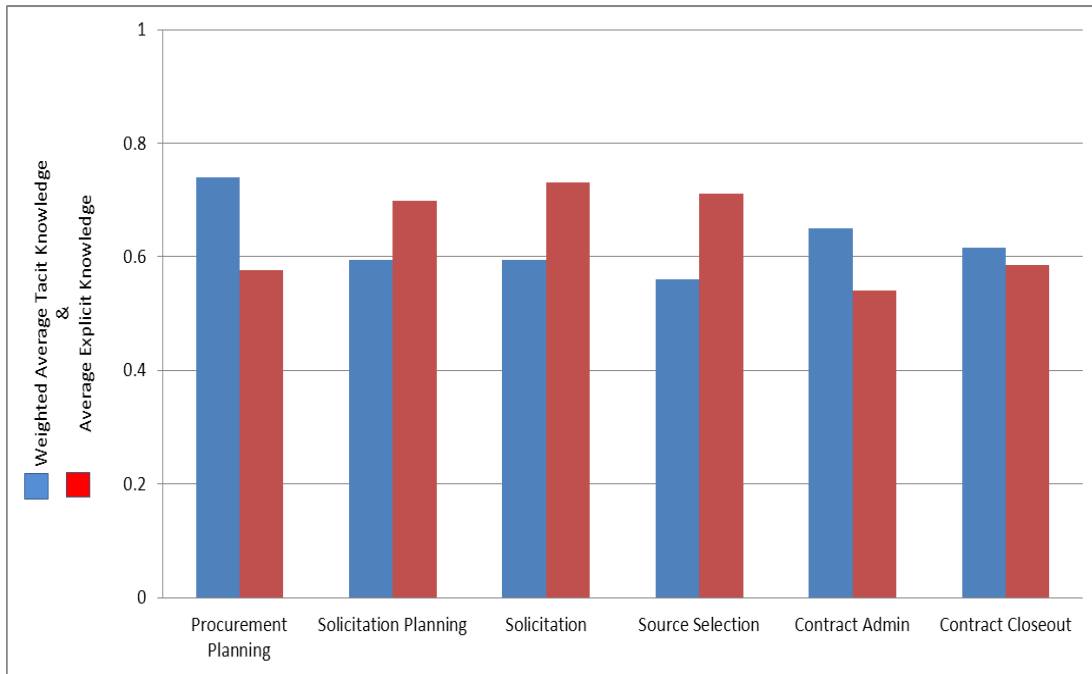


Figure 27. Aggregate Career Field Knowledge

C. ANALYSIS

Following a thorough analysis of the research findings, the data revealed a major theme relevant to the results of the data. Based on data, contracting professionals generally have less factual (explicit) knowledge in the phases of contracting they perform (tacit) the most, and generally have more factual (explicit) knowledge in the contracting phases they perform (tacit) the least. The research supports this theme through gap analysis based on the survey results for specific demographic areas. For the purposes of analysis, we defined a knowledge gap as a 10% or greater difference between explicit and tacit knowledge levels for any particular contracting phase.

The research analyzed the most relevant gaps identified by the survey results. Although there was an exponential combination of possibilities in the number of gaps that may be analyzed among and between the demographic areas surveyed, we only analyzed gaps that were prevalent, relevant, and within the scope of this research.

1. Knowledge Analysis by DAWIA Certification

The data reveals that with every successive DAWIA contracting certification, there is a definitive increase in tacit knowledge across all phases of contracting. This is also the case with explicit knowledge for most phases, the two exceptions being Contract Administration and Contract Closeout. Furthermore, the data reveals that the tacit and explicit knowledge gap in each phase generally decreases with each increase in certification level. This increase in tacit knowledge by DAWIA certification level is illustrated in Figure 28. The most probable reason for the increase in tacit knowledge is due to the experience required for each certification level. As individuals progress to higher certification levels, the more “hands-on” experience they obtain.

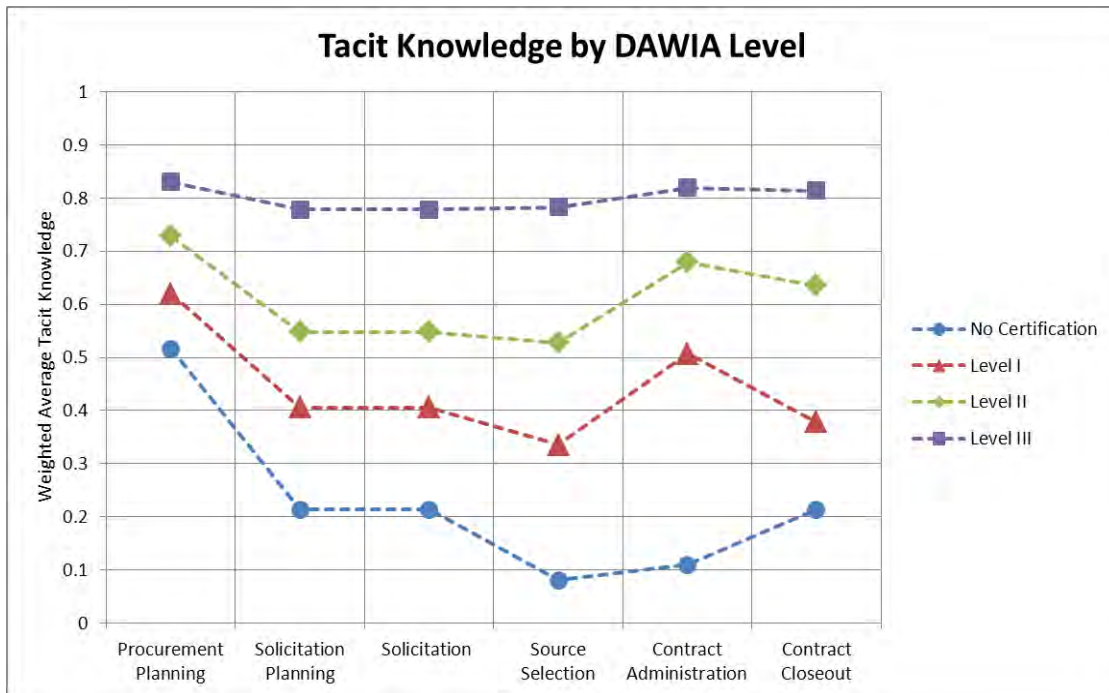


Figure 28. Tacit Knowledge by DAWIA Certification Level

Interestingly, all certification levels receive substantial experience in procurement planning and, with exception of those not holding a certification, contract administration. This appears to indicate that procurement planning and contract administration generally comprise the largest amounts of “hands-on” experience throughout DAWIA certification

progression. The largest change in tacit knowledge is realized in contract administration between no DAWIA certification and DAWIA Level I, indicating that contract administration, in addition to procurement planning, receives substantial experience from the beginning of a contracting professional's career.

As shown in Figure 29, explicit knowledge, similar to tacit knowledge, generally increases with subsequent certification levels. Contract administration is apparently an exception to the progression. Surprisingly, contract administration sees the highest explicit knowledge level from individuals with no certification. The knowledge level then drops with Level I and gradually increases with succeeding certifications. This appears to indicate that the majority of explicit contract administration knowledge is obtained at the lowest certification level. The apparent drop in explicit knowledge is possibly attributable to a lack of continuous contract administration training. Furthermore, when compared with Figure 28, procurement planning explicit knowledge does not appear to receive the level of training commensurate to the level of tacit knowledge obtained. Specifically, tacit knowledge consistently exceeds explicit knowledge in each certification category for procurement planning.

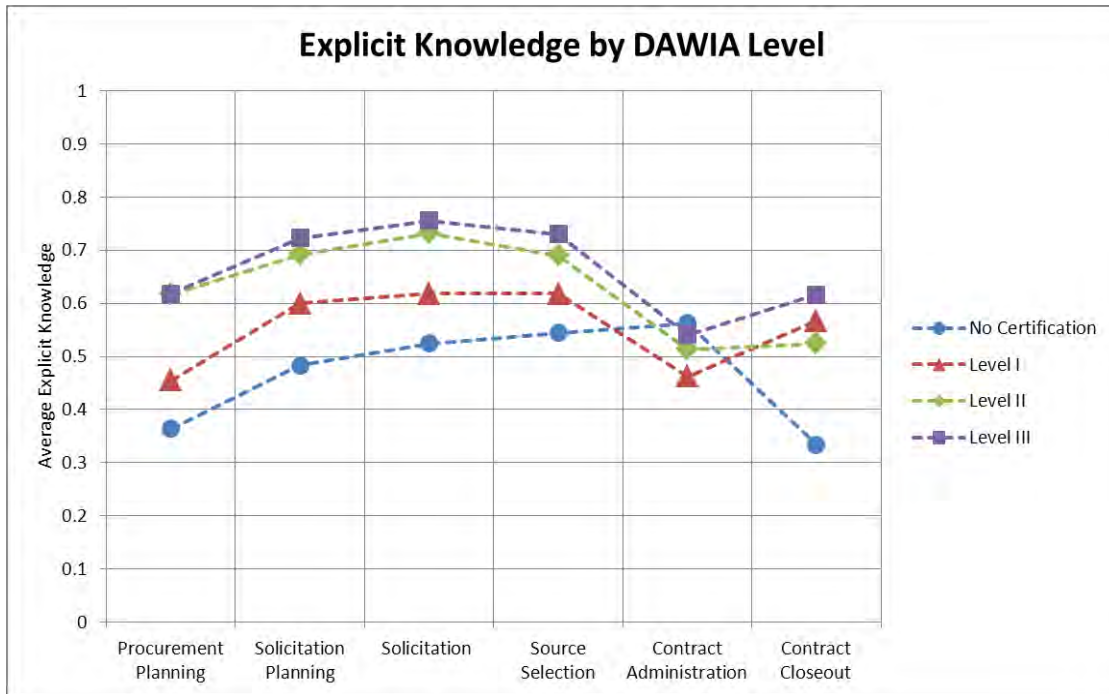


Figure 29. Explicit Knowledge by DAWIA Level

Figure 30 depicts the explicit and tacit knowledge gaps for each DAWIA certification level. Despite the inconsistent appearance, the graph shows that with increased certification, gaps in Solicitation Planning, Solicitation, and Source Selection are effectively closed—below the 10% threshold.

Procurement Planning and Contract Closeout maintain a consistent gap averaging approximately 16%. Contract Administration realizes a rapid gap decrease, followed by a rapid increase. These changes represent a dramatic shift from mostly explicit to mostly tacit knowledge. Initially, contracting personnel have substantially more explicit knowledge than tacit knowledge. As individuals progress to higher certifications, tacit contract administration knowledge increases, thus closing the gap. After closure, tacit knowledge then quickly surpasses explicit knowledge, re-opening the contract administration knowledge gap.

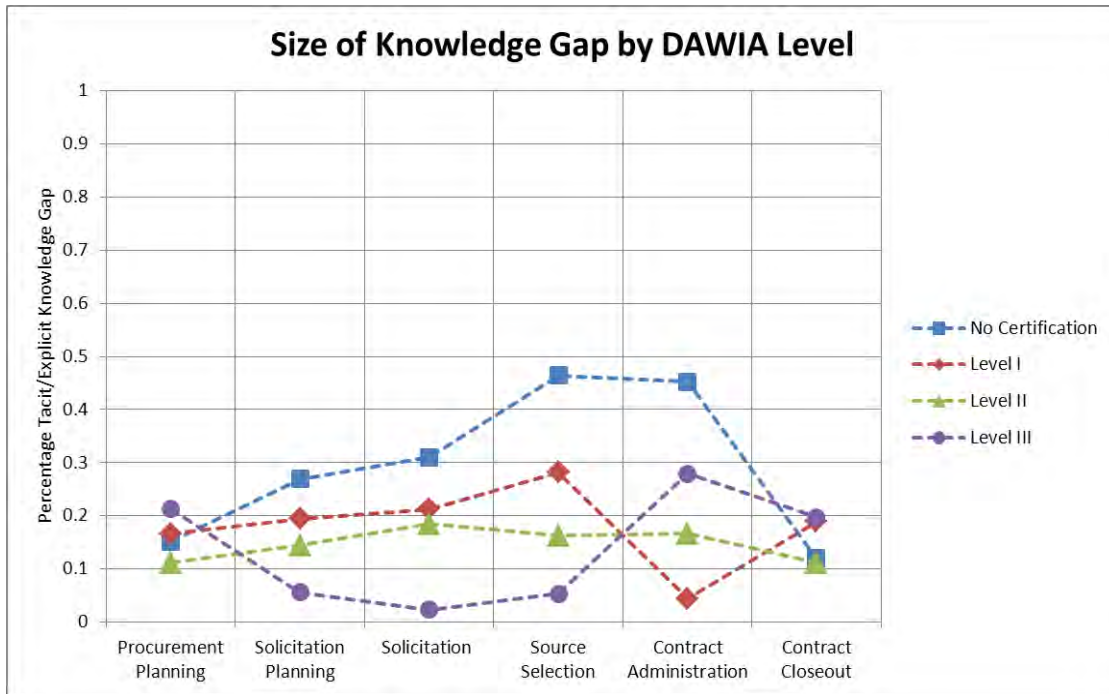


Figure 30. Size (%) of Knowledge Gap by DAWIA Level

Overall, it would seem that explicit and tacit knowledge increases concurrently with DAWIA certification levels. Based on our data, DAWIA’s certification intent to build and reflect knowledge appears to be working. Though DAWIA certifications reflect knowledge growth, adjustments in explicit knowledge training focus areas may be implemented to reduce knowledge gaps.

2. Knowledge Analysis by Career Series

The intent of viewing tacit and explicit knowledge levels by career series is not to gauge progression of knowledge, but rather to provide a relevant knowledge level comparison between the different types of contracting professionals within the Air Force. Based on survey results, it is apparent that officers and enlisted personnel reflect similar knowledge levels, both tacit and explicit, despite the bachelor’s degree requirement for officers. This might be attributable to the DAWIA education requirement of 24 college business credit hours for all contracting personnel, regardless of career series.

Additionally, enlisted personnel are required to progress through a contracting on-the-job (OJT) training program. The OJT program requires enlisted personnel to demonstrate various contracting functions that are documented and approved by the individual’s supervisor. No such OJT program is currently required for officers. Both DAWIA education requirements and the OJT program provide a level “playing field” between officer and enlisted personnel with respect to knowledge. Officer, enlisted, and civilian knowledge levels are displayed in Figures 31 and 32. Due to the similar knowledge levels between officer and enlisted personnel, the remainder of the career series analysis is viewed as a comparison between military and civilian personnel.

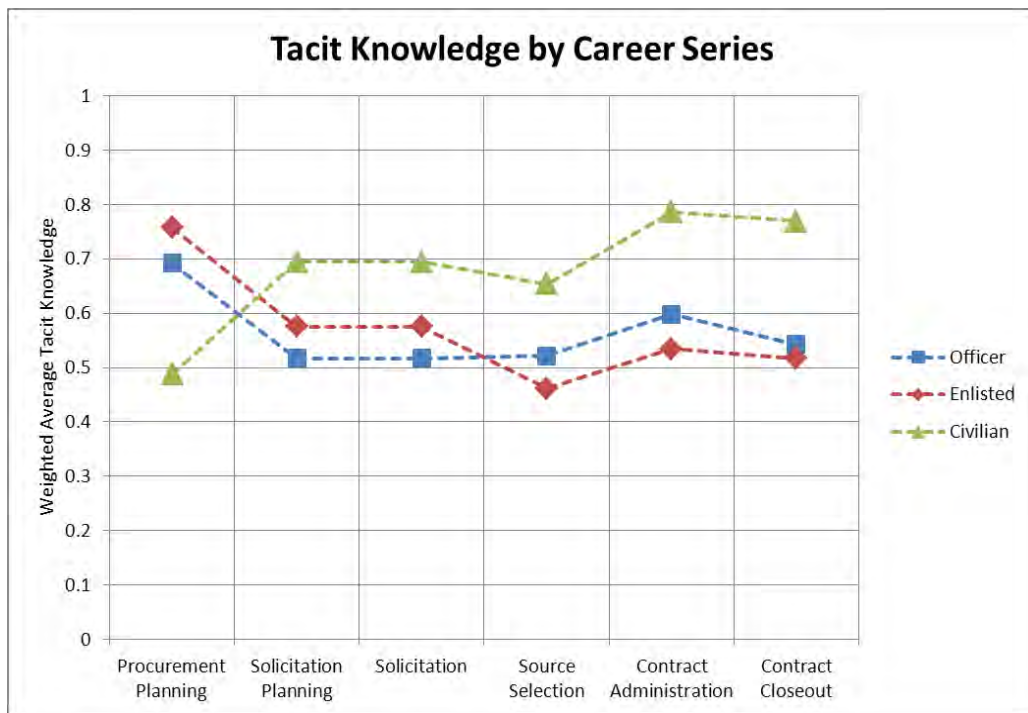


Figure 31. Tacit Knowledge by Career Series

As illustrated in Figure 31, civilians tend to have more tacit knowledge than military personnel. This observation is not surprising given that civilians tend to remain in the same contracting organization for extended periods of time. It is widely known that civilian personnel represent the continuity of the contracting career field since military personnel are often required to move to different installations every couple of

years. Furthermore, a primary role of military personnel is to deploy and project contracting operations in support of U.S. operations around the world. Training for, and actual deployments, require military personnel to spend days, weeks, or months away from their home contracting organization. Military personnel are expected to participate in professional military development activities, volunteer activities, and additional duties assigned by supervisors, sometimes making it difficult for military personnel to achieve the same level of tacit knowledge as civilian personnel.

Despite the differences previously discussed, Figure 31 indicates that similar trends do exist. With the exception of Procurement Planning, both military and civilian personnel’s tacit knowledge appears to have a relative corresponding change for each contracting phase. Tacit knowledge in Solicitation Planning, Solicitation, and Source Selection appears lower than Contract Administration.

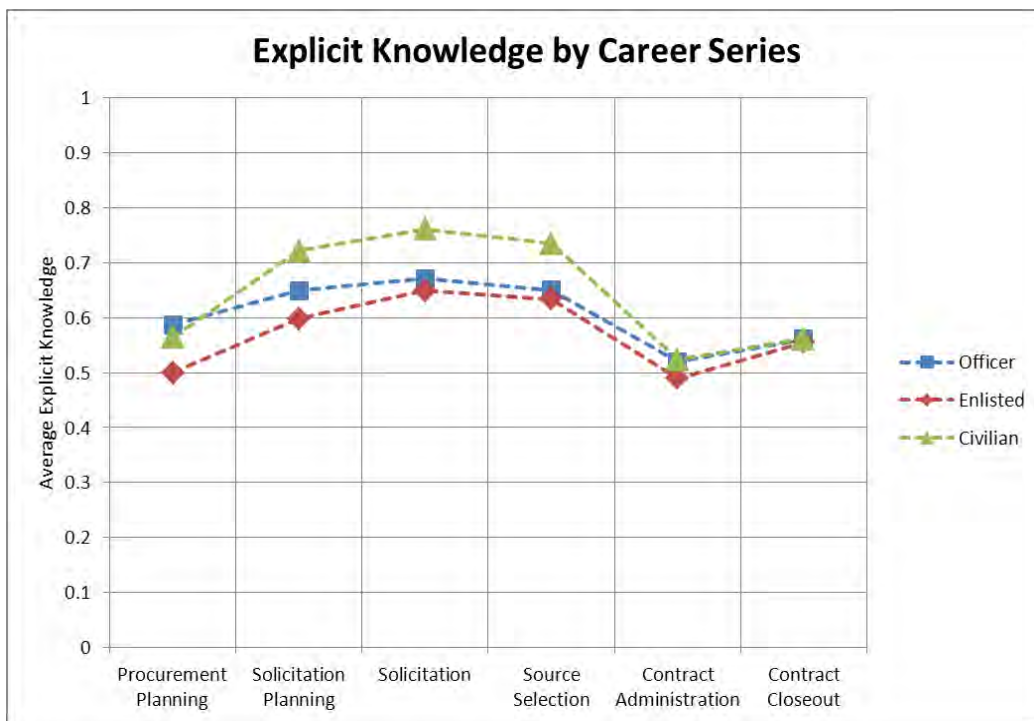


Figure 32. Explicit Knowledge by Career Series

As depicted in Figure 32, the relationship between Solicitation Planning, Solicitation, Source Selection, and Contract Administration has reversed. Explicit knowledge for all career series reaches its lowest point in the Contract Administration phase, despite Contract Administration having generally the highest level of tacit knowledge. In addition, it appears civilians generally have higher explicit knowledge than military personnel. Overall, contracting personnel generally have less factual (explicit) knowledge in the phases of contracting they perform (tacit) the most. As seen in Figures 28 and 29, this is consistent with knowledge levels found in the analysis of DAWIA certification.

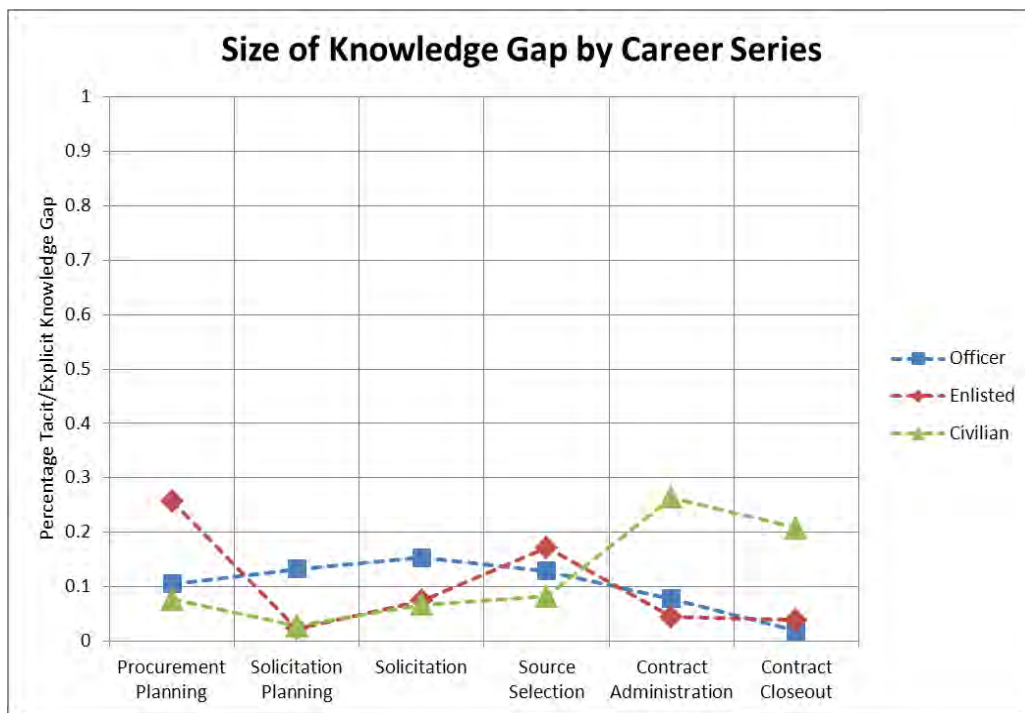


Figure 33. Size of Knowledge Gap by Career Series

Figure 33 represents the gap between tacit and explicit knowledge for the three career series. The most notable gap exists for civilians in the Contract Administration phase. Additionally, this figure illustrates a significant difference between civilian and military knowledge gaps in the Contract Administration phase. As Figure 32 shows, explicit knowledge for all careers series is approximately equal in Contract

Administration, thus the difference lies in the tacit knowledge. Civilian personnel greatly exceed military personnel in Contract Administration tacit knowledge. A possible reason for the gap is that military personnel tenure is generally much shorter than the life of many contracts. Furthermore, military job rotations tend to emphasize breadth rather than depth of knowledge.

3. Knowledge Analysis by Years of Experience

Survey results show that with increasing years of experience, there is a definitive increase in tacit knowledge across all phases of contracting. This increase is also the case with explicit knowledge, although not as dramatic. Overall, the results are very similar to those of DAWIA certification, which is most likely due to the minimum experience requirements needed to achieve additional DAWIA certification levels.

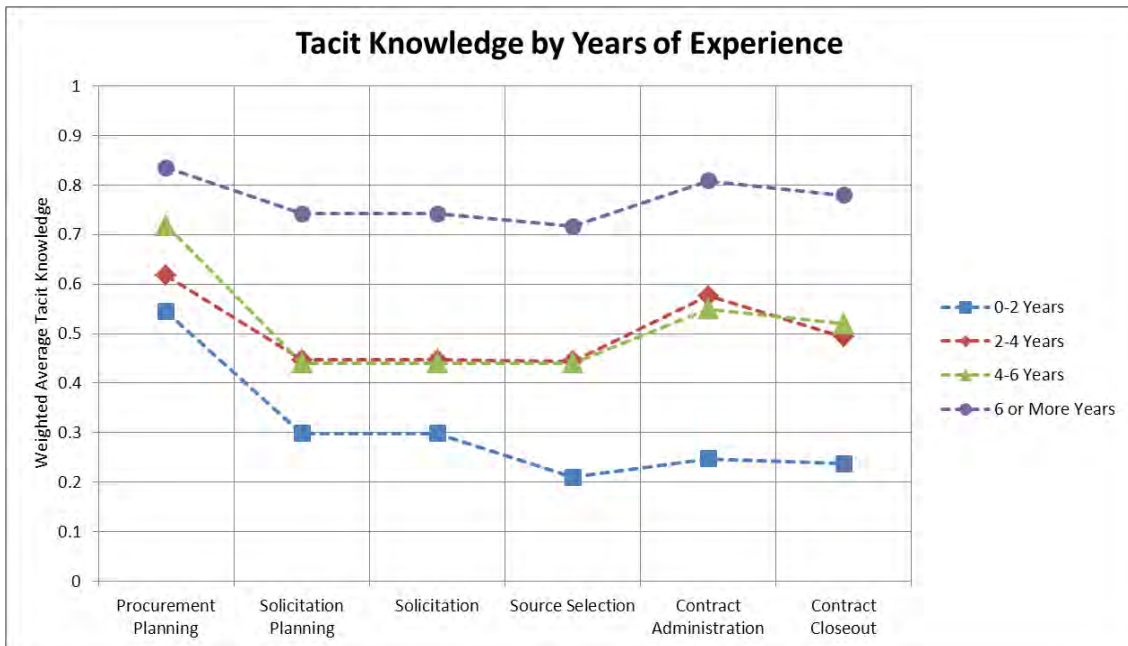


Figure 34. Tacit Knowledge by Years of Experience

Tacit knowledge, as shown in Figure 34, increases as a contracting professional's time in contracting increases. More significant than the knowledge progression is the drastic change in knowledge between certain year categories, and the apparent lack of change for other year categories. For example, there is an approximately 30% increase in

Contract Administration tacit knowledge from the 0–2 Years category to the 2–4 Years category. There is another increase of 25% from the 4–6 Years category to the 6 or more Years category. Very peculiar, there is almost no change in the middle of those categories, the 2–6 Year range. The exact same scenario is evident across all of the phases with the exception of Procurement Planning. Stated differently, for all phases except Procurement Planning, contracting personnel experience remains at approximately the same level for the four-year time period. The most likely reason for the stagnation is that personnel are performing contracting tasks previously learned in the 0–2 Year category, and supervisors are maturing their skills to the extent they are given increased responsibility at approximately the six-year point.

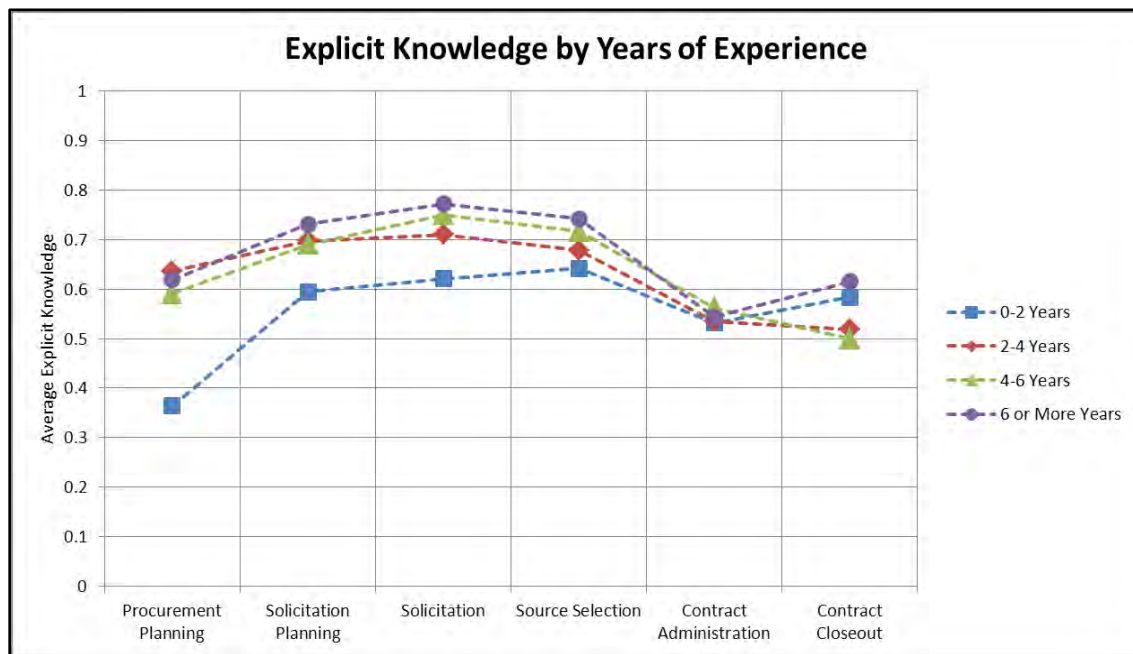


Figure 35. Explicit Knowledge by Years of Experience

Figure 35 shows remarkably similar results to the explicit knowledge in both DAWIA and Career Series analyses. Consistent with those analyses, explicit knowledge increases as years of experience increases, but at a significantly lower rate than tacit knowledge. The exception to this increase is Contract Administration, which stays virtually stationary. As shown in the 0–2 Year category, personnel begin with a moderate

amount of explicit knowledge obtained through initial career training. The largest increase is realized between the 0–2 and 2–4 Year categories. After this point, only minimal increases in explicit knowledge are recognized. The figure presents yet another observation of consistency between DAWIA, Career Series, and Years of Experience explicit knowledge analyses. All three analyses generally show that explicit knowledge in Procurement Planning, Contract Administration, and Contract Closeout is lower than explicit knowledge in Solicitation Planning, Solicitation, and Source Selection.

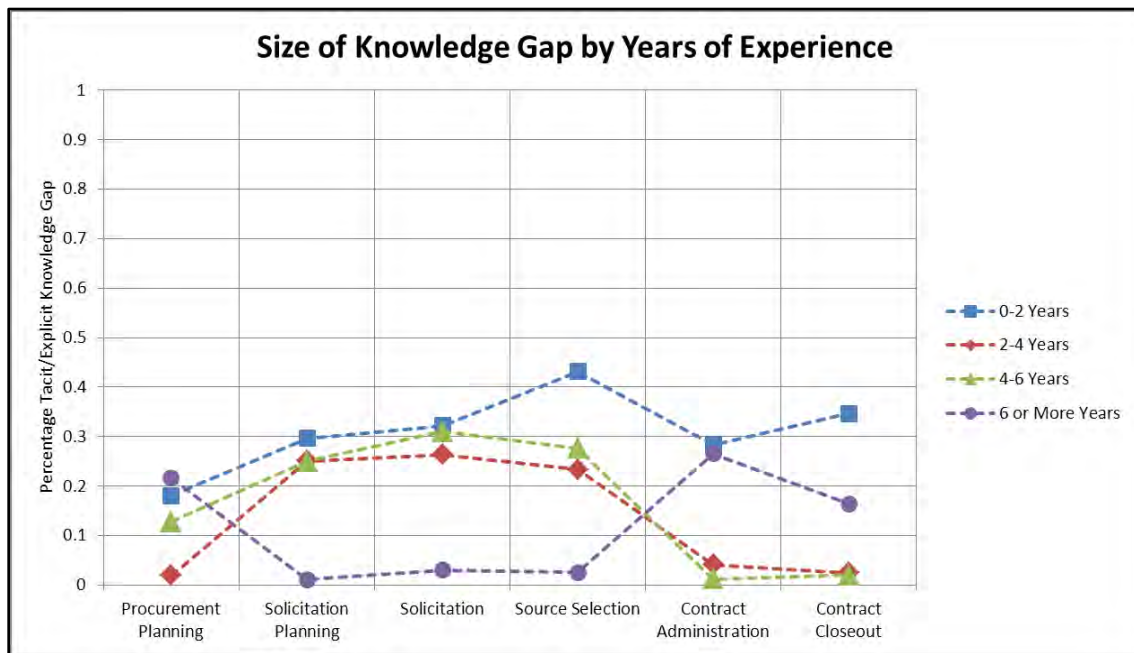


Figure 36. Size of Knowledge Gap by Years of Experience

Figure 36 shows the largest gap differential occurs between the Six or More Years and other categories in the areas of Solicitation Planning, Solicitation, and Source Selection. It is suspected the primary reason for the gap is that supervisors are reluctant to assign these responsibilities to junior contracting personnel. This is most likely due to source selections often being highly visible and possibly subject to adverse risks, such as protests, and public scrutiny, such as scandals.

Similar to the gaps noted in the analysis of DAWIA, the knowledge gap in Contract Administration continues to fluctuate due to the aforementioned stationary effect of explicit knowledge within that phase. As seen in Figure 29, upon initial entry

into the contracting career field, explicit knowledge in Contract Administration is at its near maximum level. As years progress, tacit knowledge approaches and then surpasses explicit knowledge, resulting in the fluctuating gap.

4. Aggregate: Career Field Knowledge

All survey results, when combined, clearly show distinctive knowledge gaps across the six phases of contracting. Figure 37 reveals two distinctive gaps. The first gap occurs between Solicitation Planning, Solicitation, and Source Selection, where explicit knowledge exceeds tacit knowledge. The second gap is evident in the Procurement Planning and Contract Administration phases, where the opposite is true and tacit knowledge exceeds explicit knowledge.

We identify two possible reasons for the first gap. The first reason is initial contract training (explicit knowledge) focuses heavily on imparting explicit knowledge of Solicitation Planning, Solicitation and Source Selection to better prepare contracting personnel in these areas due to the increased risk. These risks may include increased requirement for oversight due to improper contractor selection, pre- and post-award protests, and public scrutiny. The second reason may be that contracting personnel with less than six years experience do not generally appear to be given the increased responsibility in these three areas. This is probably due to the fact that highly visible contracting processes are usually restricted to those contracting professionals with more experience.

The second gap we identified is in the areas of Procurement Planning and Contract Administration. In these areas explicit knowledge is lowest, even though there is significant experience in these areas. One possibility for this gap is that initial explicit contract training focuses more on the areas that are not performed by those with less experience.

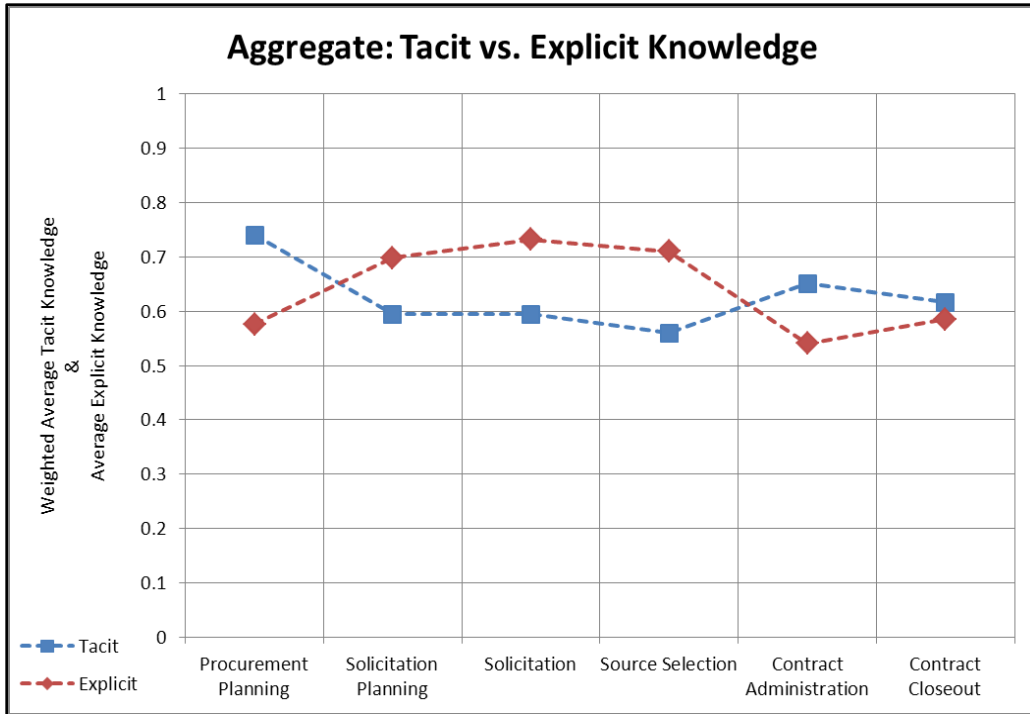


Figure 37. Aggregate: Tacit vs. Explicit Knowledge

As mentioned earlier in the chapter, our research defines a knowledge gap as a differential of 10% between tacit and explicit knowledge for any given contract phase. As shown in Figure 38, all contracting phases, with the exception of Contract Closeout, contain a knowledge gap. Of the identified gaps, Procurement Planning appears to have the largest gap of approximately 16.5%. The following section provides recommendations to close the gaps identified in this chapter.

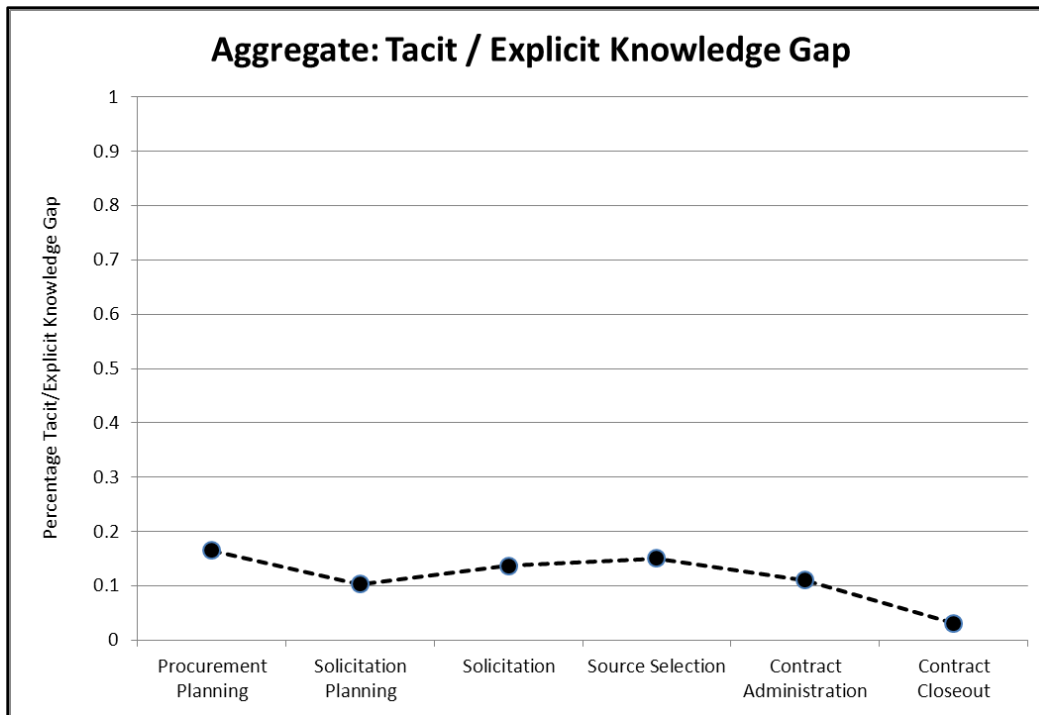


Figure 38. Aggregate: Tacit / Explicit Knowledge Gap

D. RECOMMENDATIONS

1. Recommendation #1: Reallocation and Timing of Contract Training

Our research recommends allocating more initial training focus to Procurement Planning and Contract Administration and less emphasis, if no other alternative, to Solicitation Planning, Solicitation, and Source Selection. As shown in the DAWIA and Years of Experience analyses, the majority of explicit knowledge is gained early in the contracting professional's career. By spreading the initial training more towards Procurement Planning and Contract Administration and away from Solicitation Planning, Solicitation, and Source Selection, explicit training knowledge is more evenly spread amongst the six phases. Solicitation Planning, Solicitation, and Source Selection focused training should be conducted in the DAWIA Levels II and III demographics, where individuals are actually beginning to perform those functions. This approach will provide time-phased training that corresponds with the activities that contracting personnel are actually doing and may reduce the knowledge gap between tacit and explicit knowledge for all demographic categories over the length of their careers.

2. Recommendation #2: Implement Required Contract Administration and Procurement Planning Courses in DAWIA Level I Certification

Currently, no courses dedicated specifically to Contract Administration and/or Procurement Planning are required for DAWIA Level I certification. As indicated by the analysis, Contract Administration and Procurement Planning explicit knowledge levels are significantly lagging tacit knowledge levels in those phases. Developing and incorporating required courses specifically targeting these phases may facilitate the objective of Recommendation #1, and deliver the requisite knowledge needed early in the contracting career. Additionally, analysis shows that Contract Administration and Procurement Planning explicit knowledge for DAWIA Levels II and III respondents continues to lag tacit knowledge. Continuous training in Contract Administration and Procurement Planning may be required to allow explicit knowledge levels to grow with tacit knowledge levels in those phases. Developing and offering optional Continuous Learning Modules, targeting those phases for DAWIA Levels II and III individuals, may facilitate continued knowledge growth.

3. Recommendation #3: Officer On-the-Job Training (OJT) Program

Our research recommends the design and implementation of an OJT program for officers that resembles the current enlisted OJT program. Such a program for officers may increase officer tacit knowledge levels, thus reducing the difference between officer and civilian tacit and explicit knowledge gaps. Our research results indicate that 38 of 45 survey respondents, or 84%, identified OJT as the method of greatest learning. Implementation of an OJT program will require officers to demonstrate critical contracting skills that are necessary to build a solid contracting knowledge foundation expected of future operational contracting squadron commanders.

4. Recommendation #4: Develop and Implement a Deficiency-Targeted Training Plan

To improve explicit knowledge in specific contracting phases, we recommend contracting organizations identify deficient areas and develop tailored training plans to address those deficiencies. One example of such a plan is the Air Education and Training

Command (AETC) Top Ten Training Plan. AETC identified deficiencies based on a meta-analysis of 2008–2009 results of Staff Assistant Visit reviews, AETC Inspector General inspections, and Headquarters AETC Business Partner reviews. The analysis identified over 400 deficiency trends and developed monthly training plans to be executed by subordinate operational contracting squadrons. The AETC Top Ten Training plan and 2011 training schedule are found in Attachments 1 and 2, respectively. Although the plan was developed at the Major Command (MAJCOM) level, such plans can be implemented at any level.

E. SUMMARY

In this chapter, we presented the findings of the research survey. The findings were broken down by demographic category to facilitate the analysis process. The analysis of the results identified multiple knowledge gaps both within and across demographics. Finally, we made recommendations for closing the relevant knowledge gaps identified during the analysis process. The next chapter will provide a conclusion for the research project along with areas for further research.

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VI. SUMMARY, CONCLUSION, AND AREAS FOR FURTHER RESEARCH

A. SUMMARY

The mission of an operational contracting unit is to acquire the goods and services necessary to support the activities of a military installation. To accomplish this task, operational contracting professionals must adapt to an ever-changing regulatory environment and be knowledgeable in contracting as well as government and private-sector business practices. The contracting process is divisible into six distinct phases: Procurement Planning, Solicitation Planning, Solicitation, Source Selection, Contract Administration and Contract Closeout, each requiring a unique set of skills and abilities. Due to the complexity of the work, the capability to assess an individual's operational contracting knowledge is a valuable resource.

Currently, no standard or effective method exists to gauge a contracting professional's knowledge and experience level. The most common practice in the Air Force is to review an individual's Defense Acquisition Workforce Improvement Act (DAWIA) certification level and total number of years in the contracting career field. Unfortunately, this method does not provide an adequate reflection of an individual's contracting knowledge. A review of knowledge management literature provided significant insight into how comprehensive knowledge is a combination of both tacit (experiential) and explicit (factual) knowledge. The capability to separate and analyze these two different types of knowledge enables the identification of gaps in an individual's explicit and tacit contracting knowledge. Once knowledge gaps are identified, it may be possible to close those gaps. In closing a knowledge gap, we reduce the limiting effect that one type of knowledge has over the other, thus bringing the two types of knowledge into equilibrium and maximizing the contracting professional's current level of capability.

To capture the data needed to analyze operational contracting knowledge, we developed a survey-based knowledge assessment tool. The assessment utilizes demographic and multiple-choice questions that are designed to follow the model of tacit

and explicit knowledge, and consists of three separate sections of questions: demographic, tacit knowledge, and explicit knowledge. Explicit knowledge questions were obtained with permission from the National Contract Management Association's (NCMA's) Certified Federal Contracts Manager (CFCM) certification study guide practice test. The tacit knowledge questions were developed by first identifying which of the six phases of contracting they would address, and then verifying their validity by referencing the applicable Federal Acquisition Regulation (FAR) part. Lastly, each question was reviewed for overall fit and relevancy. Once the survey was completed, it was distributed to two Air Force operational contracting units and Air Force Master of Business Administration (MBA) contracting students attending the Naval Postgraduate School.

Analysis of the findings from the survey responses indicated multiple gaps both within and across the demographic categories included in the survey. In addition to major demographic categories, the survey results enabled analysis at the contract phase level, revealing additional gaps across the entire contracting process. After performing a gap analysis, we provided four recommendations that would potentially reduce or close the previously identified gaps.

B. CONCLUSION

The goal of this research was to develop a tool to assess and identify tacit and explicit knowledge gaps in operational contracting, perform a gap analysis on the survey results, and make recommendations to close knowledge gaps where applicable. Following the development and distribution of the Air Force Operational Contracting Knowledge Assessment (OCKA-AF), a knowledge gap analysis was performed within and across multiple demographic categories. Using the gap analysis results, we were able to make four recommendations to close or reduce existing knowledge gaps. This research sought answers to the four research questions identified in Chapter I.

1. Does a Gap Exist between Explicit and Tacit Contracting Knowledge with Respect to the Six Phases of Contracting?

The first research question is whether or not a gap exists between explicit and tacit contracting knowledge, with respect to the six phases of contracting. Our research determined that indeed, there are significant gaps between explicit and tacit knowledge among all six phases of contracting, but the extent of the gaps vary among the various demographics surveyed. In aggregate, tacit knowledge exceeds explicit knowledge in the Procurement Planning, Contract Administration, and Contract Closeout phases, while explicit knowledge exceeds tacit knowledge in the Solicitation Planning, Solicitation and Source Selection phases. In the analysis section, we highlighted the gaps between explicit and tacit knowledge within the six phases, and made subsequent recommendations on the potential methods and means to close those gaps in the recommendations section.

2. Are the Gaps Consistent across the Various Demographics Surveyed?

The second question was whether or not any of the aforementioned gaps are consistent across the various demographic areas surveyed. In the DAWIA demographic category, both tacit and explicit knowledge generally increased with each successive level of certification. Substantiating this observation is the fact that overall tacit and explicit knowledge also generally increased with a similar increase in number of years of experience. These results were not surprising given DAWIA's experience requirements for certification. It was also observed that civilians generally had higher tacit knowledge than military personnel, possibly due to military job rotation requirements and differences in the respective career tracks. Additionally, we found it interesting that explicit knowledge levels in the Contract Administration phase remained relatively stationary regardless of DAWIA level, years of experience, or career series. Analysis of aggregate data also provided insight into other gaps. Explicit knowledge levels consistently exceeded tacit knowledge levels in the Solicitation Planning, Solicitation, and Source Selection phases while tacit knowledge levels exceeded explicit in the Procurement Planning and Contract Administration phases. This corresponds with the research theme that contracting professionals generally have less factual (explicit) knowledge in the

phases of contracting they perform (tacit) the most, and generally have more factual (explicit) knowledge in the contracting phases they perform (tacit) the least.

3. Do Any Practices, Processes, or Procedures Contribute to the Gaps?

The third question was whether or not any contracting practices, processes, or procedures contributed to the gaps revealed in the findings. Based on analysis of the aggregate responses, explicit knowledge was much higher in Solicitation Planning, Solicitation, and Source Selection, even though these areas represented the lowest tacit knowledge levels. Conversely, Procurement Planning and Contract Administration had the lowest explicit knowledge levels, even though they represented the highest tacit knowledge areas. With such a fluctuation in explicit knowledge, we identified training as the most probable contributor to the gap. To understand the effect of training, analysis in the years of experience demographic was accomplished. This revealed that new entrants into the contracting career field had much higher explicit knowledge in Solicitation Planning, Solicitation, and Source Selection, which implied initial contract training focused on those areas. For the same new entrants, explicit knowledge in Procurement Planning and Contract Administration was low, which implied a reduced focus on those areas. Although we understood that Source Selection was often a high visibility phase, Contract Administration is becoming equally scrutinized. We recommended that training be spread more evenly across the other phases, with specialized training introduced later in a contracting professional's career, when they are more likely to need and use those particular skills.

4. What Are Some Recommendations to Close Any Existing Knowledge Gaps?

The fourth and last research question concerned recommendations to close knowledge gaps identified by the survey findings. After performing a gap analysis on the survey results, we provided four recommendations to reduce or close the knowledge gaps. We recommended reallocating contract training, requiring separate procurement

planning and contract administration training for DAWIA Level I certification, developing an officer on-the-job contract training program, and implementing a contract deficiency-targeted training plan.

Ultimately, this research successfully developed an operational contracting knowledge assessment tool that provided a medium for gathering contract knowledge data. The collection and analysis of this data enabled the identification of knowledge gaps and trends across multiple demographics, upon which gap-closing recommendations were made. Although the OCKA-AF provided a foundation for operational contracting knowledge assessment, we believe this is only a starting point upon which future contracting knowledge assessment improvements can be made.

C. AREAS FOR FURTHER RESEARCH

This research uncovered clear and consistent knowledge gaps between tacit and explicit knowledge. We were able to determine these gaps with the development and deployment of the OCKA-AF. While we are confident the results provided by the OCKA-AF survey are reflective of the knowledge held by the sample population, they understand that additional research should be conducted in the area of contracting knowledge assessment. Below are additional areas recommended for further research.

In order to effectively capture, evaluate, and understand the comprehensive knowledge currently within the entire career field, we recommend the OCKA-AF be deployed to a greater population within the contracting workforce. Further, future research should strive to achieve equal representation of the different demographics assessed. With a larger population and equal representation, accurate inferences can be made on the operational knowledge levels for the entire career field.

In future research efforts, a better way to gauge the extent of actual “hands-on” experience may be required. We recommend restructuring tacit knowledge questions to measure time spent performing the different phases of contracting. While the tacit knowledge data in this research does measure the “hands-on” experience of the personnel surveyed, it did not measure the time spent performing actions within the six phases of contracting.

Tailoring the survey is an area that may need to be addressed in order to promote a higher completion rate. Such revisions may include reducing the number of questions to promote a higher number of complete responses. When tailoring the survey, future research should ensure that each phase receives the appropriate level of consideration in order to maintain the integrity of the assessment.

As stated earlier, we believe that the OCKA-AF provided results reflective of the knowledge levels held currently by operational contracting personnel; however, as the literature review details, operational contracting is not the only function performed by the contracting workforce. We recommend this research be expanded to assess weapons system contracting knowledge, and analyze potential knowledge gaps that may exist. Should this research be performed, the survey would need to be revised to reflect weapons system specific tacit and explicit knowledge questions.

Lastly, this research has shown that the OCKA-AF can successfully assess knowledge levels for individuals and sample populations. Thus, our final, and potentially most valuable, recommendation is to tailor the assessment into an easily usable squadron commander tool to measure organizational knowledge. Transforming the OCKA-AF into a single software program may allow commanders to periodically gauge individual or organizational knowledge. This information can facilitate focused training, personnel rotations, and internal policy reform decisions, leading to a more effective, efficient, and knowledgeable contracting organization.

LIST OF REFERENCES

- Congressional Research Service (CRS). (2010, April 23). *Defense acquisitions: How DoD acquires weapon systems and recent efforts to reform the process* (CRS RL34026). Retrieved from <http://www.fas.org>
- Defense Acquisition University (DAU). (2008). *Mission statement*. Retrieved June 6, 2011, from <http://www.DAU.mil>
- Defense Acquisition University (DAU). (2010). *Defense Acquisition University annual report 2010*. Retrieved from DAU website: <http://www.DAU.mil>, accessed June 2011.
- Department of the Air Force (DAF). (2009). *Air Force policy directive 63-1 acquisition and sustainment lifecycle management*. Washington, DC: Department of the Air Force.
- Department of the Air Force (DAF). (2006). *Air Force policy directive 64-1 the contracting system*. Washington, DC: Department of the Air Force.
- Department of the Air Force (DAF), Office of the Secretary of the Air Force, Acquisition—Contracting (SAF/AQC). (2005, July). *Career planning guide for contracting professionals*. Retrieved from <http://ww3.safaq.hq.af.mil>
- Defense Acquisition Workforce Improvement Act of 1990, 10 U.S.C. ch. 87 §§ 1721–1730 and §§ 1741–1760 (2011).
- Department of Defense. (2006, July 7). *Defense acquisition guidebook (Ver. 1.6)*. Retrieved from <https://acc.dau.mil>
- Department of Defense Inspector General. (2009). *Report No. D-2009-071, Summary of DoD office of inspector general audits of acquisition and contract administration*. Washington, DC: DoD IG.
- Director, Defense Procurement and Acquisition Policy (DPAP). (2008). *Competency-based management for the DoD-wide contracting community*. Briefing retrieved from DPAP website: www.acq.osd.mil
- Federal Acquisition Regulation (FAR), 48 C.F.R. ch. 1 (2011).
- Government Accountability Office. (GAO). (2005, January). *High risk series: An update* (GAO-05-207). Retrieved from GAO: <http://www.gao.gov>
- Government Accountability Office. (GAO). (2006, July 7). *Contract management: DOD vulnerabilities to contracting fraud, waste, and abuse* (GAO-06-838R). Retrieved from GAO: <http://www.gao.gov>

- Government Accountability Office. (GAO). (2009, March 25). *DOD: Additional actions are needed to effectively manage and oversee DOD's acquisition workforce* (GAO-09-342). Retrieved from GAO: <http://www.gao.gov>
- Government Accountability Office. (GAO). (2010, October 28). *Defense acquisition workforce: DOD's training program demonstrates many attributes of effectiveness, but improvement is needed* (GAO-11-22). Retrieved from GAO: <http://www.gao.gov>
- Government Accountability Office. (GAO). (2011, February). *High risk series: An update* (GAO-11-278). Retrieved from GAO: <http://www.gao.gov>
- Gansler, J. S., Berteau, D. J., Maddox, D. M., Oliver, D. R., Salomon, L. E., & Singley III, G. T. (2007, October). *Urgent reform required: Army expeditionary contracting*. Report of the Commission on Army Acquisition and Program Management in Expeditionary Operations. Washington, DC: Department of the Army.
- Garrett, G. A., & Rendon, R. G. (2005). *Contract management: Organizational assessment tools*. McLean, VA: National Contract Management Association.
- Manning, L., Thomas, M., & Brooks, T. (2008). DoD plans for the contracting future: The contracting competency model. *Defense AT&L*, November-December, 44–47.
- National Contract Management Association *Mission statement*. Retrieved June 6, 2011a from <http://www.NCMAhq.org>
- National Contract Management Association (NCMA). (2011b). *Contract Management Body of Knowledge* (3rd ed.). Ashton, VA: NCMA.
- Nonaka, I., & Takeuchi, H. (1995). *The knowledge-creating company: How Japanese companies create the dynamics of innovation*. New York: Oxford University Press.
- Pfeffer, J., & Sutton, R. I. (2000). *The knowing-doing gap: How smart companies turn knowledge into action*. Boston, MA: Harvard Business School Press.
- Platts, M.J., & Yeung, M.B. (2000). Managing learning and tacit knowledge. *Strategic Change*, 9, 347–355.
- Polanyi, M. (1964). *Personal Knowledge: Towards a post-critical philosophy*. New York: Harper & Row.
- Rendon, R. G. (1998). *The Changing Face of Operational Contracting*. Retrieved from: <http://www.fasmg.org/operational.html>

- Rendon, R. G., Snider, K. F., & Allen, N. (2008). *Management of defense acquisition projects*. Reston, VA: American Institute of Aeronautics and Astronautics.
- Rendon, R. G. (2011, Fall). Matrix of contract management processes linked to Federal Acquisition Regulation [Coursework, Class MN4731, session AY12]. Graduate School of Business and Public Policy, Naval Postgraduate School.
- Snider, K. (1996). DAWIA and the price of professionalism. *Acquisition Review Quarterly*, Fall 1996, 97–108. Retrieved from <http://www.dau.mil>
- Under Secretary of Defense (AT&L). (2007). *Human Capital Strategic Plan v3.0*. Washington, DC: USD(AT&L).
- Under Secretary of Defense (AT&L). (2007, November 20). *The defense acquisition system* (DoD Directive 5000.01). Washington, DC: USD(AT&L).
- Under Secretary of Defense (AT&L). (2008, December 8). *Operation of the defense acquisition system* (DoD Instruction 5000.02). Washington, DC: USD(AT&L)
- Under Secretary of Defense (AT&L). (2010, September 14). *Better buying power: Guidance for obtaining greater efficiency and productivity in defense spending* [Memorandum]. Washington, DC: USD(AT&L).
- United States House of Representatives House Report 109–452. *Report of the Committee on Armed Services, House of Representatives on House Report 5122*. May 2006, p. 350.

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APPENDIX A. AETC TOP TEN TRAINING PROGRAM TRAINING PLAN

AETC Top Ten Training Program is the strategic approach necessary to standardize and improve AETC contracting in support of the USAF mission. The training program is designed to provide training to employees at all levels. It focuses on providing information in certain focus areas rather than on development. This training is commonly referred to as the AETC “Top Ten” training. The Top Ten training is an annual schedule of contracting training topics where all AETC Contracting Squadrons will train the same topic within the same month using the same standardized training tools.

AETC Top Ten Training

The objective of the AETC Top Ten training is to present timely training to the all contracting professionals. Each month a selected topic will be presented at each Contracting Squadron command-wide. Attendance at these training sessions is mandatory. It is envisioned that the training will be presented “live” by a Contracting Squadron representative. The training will also be available on the AETC/A7K Homepage.

Development Process. The AETC Top Ten Training Team consist of [REDACTED], AETC/A7KA and a member from each AETC Squadron. AETC/A7KA will develop a proposed training list for each fiscal year. Once the list is developed, it will be presented to AETC/A7K for approval. After AETC/A7K approves the topics the Office Responsible for Training Development will be assigned to a Contracting Squadron who will develop the training and provide to AETC/A7KA 60 days prior to the scheduled training month. AETC/A7K will approve the training and provide the approved training slides to all Contracting Squadrons 30 days prior to the scheduled training month. Every Contracting Squadron would schedule and present the approved training during the training month specified by AETC/A7K.

Training Frequency. For fiscal year 2010 training will be presented two times in April and June. AETC/A7K will be responsible for development of the training slides and deployment to the Contracting Squadrons for presentation during April and June. Fiscal year 2011 training will be developed by the assigned Contracting Squadron or A7K as indicated in the AETC approved Fiscal Year 10/11 Top Ten Training Schedule.

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APPENDIX B. AETC FISCAL YEAR 10/11 TOP TEN TRAINING SCHEDULE

AETC Fiscal Year 10/11
Top Ten Training Schedule

Training Topic	Office Responsible for Training Development	Date Developed Training Due To A7K	Date Approved Training To CONS	Training Month
CAR	[REDACTED]	15-Feb-10	26-Feb-10	Apr 10
Pricing (PCM/PNM/IGE)	[REDACTED]	01-Apr-10	30-Apr-10	Jun 10
Market Research	[REDACTED]	02-Aug-10	31-Aug-10	Oct 10
J&A and D&F Preparation	[REDACTED]	01-Sep-10	30-Sep-10	Nov 10
Past Performance Evaluation	[REDACTED]	01-Oct-10	31-Oct-10	Dec 10
No Training	[REDACTED]	N/A	N/A	Jan 11
Risk Assessment & Management	[REDACTED]	01-Dec-10	30-Dec-10	Feb 11
Source Selection-Planning	[REDACTED]	03-Jan-11	31-Jan-11	Mar 11
Source Selection-L&M	[REDACTED]	01-Feb-11	28-Feb-11	Apr 11
Source Selection-Evaluation	[REDACTED]	01-Mar-11	31-Mar-11	May 11
Performance Price Tradeoffs	[REDACTED]	01-Apr-11	29-Apr-11	Jun 11
MOASP and CPARS	[REDACTED]	02-May-11	31-May-11	Jul 11
Post Award Administration	[REDACTED]	01-Jun-11	30-Jun-11	Aug 11
No Training	[REDACTED]	N/A	N/A	Sep 11
Contract Modifications	[REDACTED]	01-Aug-11	31-Aug-11	Oct 11
Exercising Options	[REDACTED]	01-Sep-11	30-Sep-11	Nov 11
Multiple Award Contracts	[REDACTED]	03-Oct-11	31-Oct-11	Dec 11

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