REQUIREMENTS OF AIR FORCE COST ANALYSTS

THESIS
March 2018

Chase M. Houser, First Lieutenant, USAF

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DEPARTMENT OF THE AIR FORCE
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Requirements of Air Force Cost Analysts

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First Lieutenant, USAF

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Abstract

This research effort intends on identifying the knowledge, skills, abilities necessary for cost analysts to be effective decision support members. The purpose of this research is to determine what levels of education, training, and knowledge are needed by cost analysts in the current career field and in the foreseeable future.

It also assesses whether cost analysts associate the levels of knowledge, skills, and abilities as requirements in fulfilling cost analyst duties. From this analysis, a suggested undergraduate education, master's degree program, and certifications were created for current and future cost analysts to strive to achieve.

To accomplish this objective, personal interviews were conducted and utilized. The recommendations of this study are intended to assist cost analysts in attaining knowledge, skills, and abilities necessary in contributing and supporting as a decision support member.

Dedication

Dedicated to everyone who was there when I needed help through this adventure.

Acknowledgments

First, I would like to thank my mom and dad for their continued support throughout each chapter in my Air Force career. Without their continued guidance and encouragement through this and each of my endeavors, I would not have been successful as I have been.

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Chase M. Houser

Table of Contents

Page

Abstract v
Table of Contents viii
List of Figures x
List of Tables xi
I. Introduction 1
Background 1
Problem Statement 2
Objective Questions/Investigative Questions 3
Research Focus 3
Methodology 3
Assumptions/Limitations 4
Summary 4
II. Literature Review 5
Previous Research 5
Air Force Instruction 36-2101 8
Defense Acquisition Workforce Improvement Act 8
Defense Acquisition University 10
Certification Standards 10
National Defense Authorization Act 12
Opposition to DAWIA 13
Chapter III. Methodology 15
Research Design and Methodology 15
Qualitative Research 15

Interview Questions 15
Population 18
Coding the Data 19
Concept Mapping 20
Summary 20
Chapter IV: Analysis Results 21
Responses 21
Interview Question Results 22
Chapter V: Conclusion and Recommendation 33
Overview 33
Objective Questions Results 33
Recommendations for Future Research 37
Appendix A 38
Interview Question Guide 38
AFIT IRB Exempt Determination Official Letter 40
Interview Responses 41
Bibliography 89
Vita 91

List of Figures

Figure Page

Figure 1: Air Force Cost Analysts (65W) Target Accession Rate for Education (AFOCD 2016) 2

Figure 2: On the Job Training Courses (Perry 1984: 54)..... 6

Figure 3: Professional Continuing Education Courses (Perry 1984: 54)..... 7

Figure 4: Q01 Concept Map 24

Figure 5: Q02 Concept Map 25

Figure 6: Q03 Concept Map 26

Figure 7: Q04 Concept Map 27

Figure 8: Q05 Concept Map 28

Figure 9: Q06 Concept Map 29

Figure 10: Q07 Concept Map 30

Figure 11: Q08 Concept Map 31

List of Tables

Table Page

Table 1: DAWIA Checklist in 1994 DAU Catalog 11

Table 2: Defense Acquisition University Cost Estimating Certification..... 12

Table 3: Interview Questions 16

Table 4: Relationship Between Objective Questions and Interview Questions 17

Table 5: Acquisition Base Locations 18

Table 6: Cost Analyst Location Breakout..... 21

Table 7: Cost Analyst Rank Breakout 22

Table 8: Interview Results 23

Requirements of Air Force Cost Analysts

I. Introduction

Background

With hundreds of billions of taxpayer dollars spent each year on goods and services, it is essential that federal acquisitions be managed in an efficient and effective manner. To drive change, leaders in the Department of Defense (DoD) have emphasized the need to improve the quality of its cost estimates. Within the DoD, the services have examined the formal education, professional work experience, training, and professional certification requirements for the financial management career field (GAO 2002).

Current Cost Analysts are coded as Air Force Specialty Code (AFSC) 65W. The Air Force Officer Classifications Directory (AFOCD) establishes the occupational structure of the Air Force officer corps and implements Air Force Policy Directive (AFPD) 23-21, *Utilization and Classification of Air Force Military Personnel*. The occupational structure is designed to permit officer personnel to specialize as necessary to meet changing mission requirements. Officers, including the cost analyst career field, under the *analytical studies officer* classification serve in, or are qualified to serve in, positions requiring the ability to conduct advanced analytical studies.

The cost career field includes analytical studies, however there are no mandatory requirements for education or previous experience. Figure 1 shows the educational requirements for 65W in the Air Force. The target accession rate for Cost Analysts in the Air Force with financial management or statistics education is >70%. The analysts are also expected to have knowledge in cost and economics, including business case analysis, financial and economic

problems and solutions, collecting data and normalizing, development of data analysis methods, risk assessment, and basic computer applications skills (AFOCD 2016). The classification of instructional programs (CIP) provides accurate tracking and reporting of fields of study and program completion activity. The CIP is used to track the number of accessions within each educational program.

Tier	*Target Accession Rate*	*CIP*	*Education Program Description*	*Requirement*
1	> 40%	45.06XX	Economics	Desired
			Or	
		52.03XX	Accounting and Related Services	
			Or	
		52.06XX	Business/Managerial Economics	
			Or	
		52.13XX	Management Sciences and Quantitative Methods	
			Or	
		52.08XX	Finance and Financial Management Services	
2	> 30%	27.XXXX	Mathematics and Statistics	Desired
			Or	
		52.XXXX	Business, Management, Marketing, and Related Support Services	
			Or	
		14.XXXX	Engineering	
3	< 30%	XX.XXXX	Any	Permitted

Figure 1: Air Force Cost Analysts (65W) Target Accession Rate for Education (AFOCD 2016)

Problem Statement

Knowledge, skills, and abilities define the body of knowledge that a cost analyst should possess to perform his or her job effectively. This body of knowledge contains both job specific knowledge which relates to the unique requirements of a given set of tasks, and general knowledge which all cost analysts should possess to be considered fully qualified analysts. This issue of knowledge, skills, and abilities is only partially satisfied by individual analysts and his or her background education. The cost knowledge needed by cost analysts is currently provided through on the job training, computer based training, and previous experience. The Defense Acquisition Workforce Improvement Act (DAWIA) established the requirements of cost knowledge needed by analysts. However, if cost analysts are expected to serve as upper

leadership decision support, an understanding of current knowledge, skills, and abilities needed by cost analysts is essential.

Objective Questions/Investigative Questions

Given the problem, there is a need to understand the knowledge, skills, and abilities (KSAs) that cost analysts in the United States Air Force need to perform their duties. To address the objectives of this thesis, four objective questions are proposed:

Q1. What bachelor's courses/master's degree programs/certificates/online courses are beneficial to the cost career field?

Q2. What are the primary *Knowledge, Skills, and Abilities* required for the cost mission?

Q3. What *Knowledge, Skills, and Abilities* do we currently need in the cost career field, but lack and/or do not teach well?

Q4. What *Knowledge, Skills, and Abilities* will the 65W career field need in the foreseeable future that are not developed today?

Research Focus

This research was conducted with the aim of identifying the KSAs needed by financial cost analysts to perform their duties both now and in the future. The specific focus of this study is government cost analysts and the KSAs required to perform in their mission sets. These mission sets are related to leading and conducting analysis and studies. Additional mission sets include estimate cost and evaluate performance against standards, operational systems, acquisition programs, and support activities in support of daily operations and the war-fighting mission (AFOCD 2016).

Methodology

Ten interviews were conducted at major acquisitions bases and data was gathered and analyzed using qualitative content analysis. Qualitative content analysis can be referred to as "a

research method for subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns" (Hsieh & Shannon, 2005, p. 1278). Qualitative content analysis allows knowledge to be expanded in a rigorous way through subjectivity and interpretation.

Assumptions/Limitations

This study lent itself to several underlying assumptions. First, the research subjects had enough relevant experiences to provide useful responses and opinions to the questions posed based upon their rank, time in service, and career background. This study focused on the KSAs needed by government cost analysts career field specifically. Therefore, all results of this study may not be directly transferable to other United States Air Force career fields, sister service financial management officers, or civilian academia and industry. In addition, time is a factor in this study and the research only includes opinions as they existed in the winter of 2017. Finally, no measurement of how important KSAs are or when they are needed was completed.

Summary

With constraining budgets and shrinking manpower pools the USAF cost analyst community needs excellent training and education. The study explores the major areas that need to be addressed as personnel development is reassessed. The Literature Review in the next chapter describes the cost analysts are responsible for and considered findings from existing research on KSAs for government cost analysts. Chapter 3 provides greater detail of methods employed to collect and analyze data. Then, Chapter 4 presents the data collected from field research and literature scans. Finally, an analysis of results is presented followed by recommendations for use by financial management within the Air Force.

II. Literature Review

Investigating the knowledge, skills, and abilities current cost analysts need in the field, the research team explored previous research and current Air Force initiatives. The researchers examined current Air Force requirements for cost analysts and examined how previous research informed their results.

Previous Research

In 1968, Robert Cook and John Greene conducted a study evaluating the relevancy of the School of Systems and Logistics curriculum to operational requirements. The team used a questionnaire to gather the necessary data to perform their evaluation. A survey of graduates from 1965, 1966, and 1967 revealed that the AFIT curriculum was adequate to meet the needs of the operation environment at the time (Cook, 1968).

In 1971, a research effort conducted by James Cushman and James Townsend evaluated the adequacy of courses available to Air Force maintenance managers for providing the necessary management education for a chief of aircraft maintenance to perform his or her duties effectively. Using a questionnaire and a guided interview, the researchers concluded that the courses available to Air Force maintenance managers provide adequate management education in both production management and communication skills. However, the courses available to the maintenance managers did not provide the necessary management base in the discipline of statistics. Only the three management disciplines of production management, communication skills, and statistics were evaluated by the researchers (Cushman, 1971).

In 1972, James Ross and Earl Steiner recognized the continuing need to evaluate the AFIT logistics education program. Their research team sought to discover if the Air Force Logistics Command (AFLC) civilian employees viewed formal education as important. They

also wanted to know what education would prepare AFLC civilian employees to be more effective managers. They concluded via a survey instrument that education was extremely important to civilian AFLC employees. They also noted that educational programs developed for logistical personnel should include management, communicative science, and personnel management as major disciplines in the curriculum (Ross, 1972: 50-52).

In 1984, First Lieutenant Phillip Perry conducted research with the objective of identifying the educational requirements that experienced Air Force cost analysts thought were most useful for adequate job performance. The researcher used surveys sent to 239 Air Force cost analysts regarding the educational requirements list and educational method most preferred. The Air Force cost analysts identified, in Figure 2, the subjects to be taught by on the job (OJT) training.

Core:

1. Federal Financial Management (6)*
2. Research and Development Management (9)*
3. Management Information Systems (10)*
4. Defense Production Management (12)*

Figure 2: On the Job Training Courses (Perry 1984: 54)

Figure 3 displays the responses of recommended courses for professional continuing education from Air Force cost analysts. Professional continuing education also represents the courses that cost analysts would be taking online or at a remote educational facility.

Core:

1. Technological Forecasting (5)
2. Federal Financial Management (6)*
3. Research and Development Management (9)*
4. Management Information Systems (10)*
5. Defense Production Managment (12)*
6. Basic Programming (17)*
7. Managerial Statistics (20)*
8. Regression I (21)*
9. Regression II (22)*
10. Quantitative Analysis (23)*
11. Technical Communications (24)*
12. Research Methods (25)*
13. Seminar in Cost Analysis (27)

Core/elective:

14. Production Management (11)*

Figure 3: Professional Continuing Education Courses (Perry 1984: 54)

In 2002, Captain Anthony Smith analyzed education, experience, and training to identify the knowledge and skills necessary for cost analysts to be an effective member during source selections. The researcher conducted personal interviews and questionnaires with 43 source selection experienced cost analysts. Recommendations were made in formal education, experience, acquisition training, source selection training, and the source selection process. A recommendation was made that members of the cost panel should have previous source selection experience (Smith 2002: 77). Two recommendations were made regarding training for source selection cost analysts; attend Defense Acquisition University courses specializing in source selection, and provide formal source selection training prior to the source selection process being conducted (Smith 2002: 78).

Air Force Instruction 36-2101

The military personnel classification system identifies duties and tasks for every position needed to accomplish the Air Force mission. The system is designed to identify qualifications and abilities necessary to accomplish these duties and tasks, as well as provide clear and visible career progression patterns. Qualifications for the Air Force Officer Classification Directory (AFOCD) includes knowledge, education, training, experience, and other factors. These are defined as mandatory or desirable for each skill level. When individuals meet all the mandatory qualifications of the specialty and have shown skill level qualifications in all tasks of the positions in which they are assigned, they are considered qualified.

Under the AFOCD 2016, for AFSC 65W, Air Force cost analysts have certain mandatory requirements needed to meet the career field. Knowledge of cost, economics, and business case analysis are some of the knowledge cost analysts are expected to know. Cost analysts are also required to have knowledge in collecting data, normalizing, and development of data analysis methods (AFOCD 2016). The requirement to become a 65W3 (Advance Level) includes the completion of the Basic Financial Management Officer course and at least 18 months of experience in cost analysis assignments. However, there are no requirements for education. According to Figure 1 in Chapter 1, there is a desired accession rate of >40% for cost analysts with an undergraduate education in either economics, accounting, managerial economics, operations research, or financial management services.

Defense Acquisition Workforce Improvement Act

The Defense Acquisition Workforce Improvement Act (DAWIA) is one of the major milestones that has shaped the way education and training is provided to Department of Defense

acquisition personnel. The purpose of this section is to provide an overview of the history of DAWIA and the types and methods of acquisition reform training provided because of DAWIA.

In 1985, the DoD called for an extensive review of the education and training function. The Defense Acquisition Workforce Improvement Act (DAWIA) was enacted by Public Law 101-510 on November 5, 1990. It required the Department of Defense (DoD) to establish education and training standards, requirements, and courses for the civilian and military workforce. The DAWIA also called for the establishment of an Acquisition Corps and professionalizing the acquisition workforce through education. According to the law, Acquisition Corps membership is limited to civilians holding positions at GS-13 or above and military rank of major/lieutenant commander or above. In addition, membership is limited to persons who have a college degree, with at least 24 semester credit hours of business management, and at least four years of acquisition work experience. The military branches can grant waivers and impose additional eligibility requirements (Public Law 109-364, October 17, 2006).

In addition to establishing standards and developing skills for the acquisition workforce, DAWIA was intended to ensure the acquisition workforce was most qualified for the positions they held. All branches comply with the law and follow the education, training, and experience requirements contained in the DoD Manual 5000.52M for certification. There are three levels of certification; basic, intermediate, and advance (Levels I, II, and III).

Defense Acquisition University (DAU) and the certification standards for specific career fields/assignments were established because of DAWIA.

Defense Acquisition University

Defense Acquisition University is the primary source of training to the DoD acquisition workforce. It was established on October 22, 1991 under DoD Directive 5000.57. The purpose of DAU is to: educate and train acquisition professionals for DoD, more effectively coordinate the existing sixteen Army, Navy, Air Force, and DoD schools, and develop education, training, research, and publication capabilities for DoD in the field of acquisition. Seven years after DAU was established, it transitioned from a consortium of unique service sponsored schools into a unified school with five regional and seven training sites. DAU provides mandatory, assignment-specific, and continuing education courses for military and civilian personnel (Cooper 2002). DAU currently offers eighty-five acquisition courses supporting certification in eleven defense acquisition career fields.

Certification Standards

DoD Directive 5000.52-dated October 25, 1991, established mandatory experience, education, and training standards for specific acquisition workforce position categories, career fields and certification guidelines for acquisition workforce members. DAWIA divided each acquisition position into three career levels for qualifying individuals: basic, intermediate, and advanced. Table 2 summaries the three certification levels:

Table 1: DAWIA Checklist in 1994 DAU Catalog

LEVEL 1	LEVEL 2	LEVEL 3
EDUCATION: ☐ (Desired) Baccalaureate degree, preferably with a major in engineering, systems management, or business administration	**EDUCATION:** ☐ (Desired) Master's degree, preferably with a major in engineering, systems management, business administration, or a related field	**EDUCATION:** ☐ (Desired) Master's degree in engineering, systems acquisition management, business administration, or related field
EXPERIENCE: ☐ One year of program management experience	**EXPERIENCE:** ☐ Two years of acquisition experience, at least one in program management ☐ (Desired) An additional 2 years of acquisition experience, preferably in a systems program office or similar organization	**EXPERIENCE:** ☐ Four years of acquisition experience with at least 2 years in a systems program office or PEO, DCMC program integrator, Army System Coordinator, or Supervisor of Shipbuilding offices. ☐ (Desired) Two additional years of acquisition experience
TRAINING: ☐ ACQ 101 Fundamentals of Acquisition ○ (Desired) One additional DAU level 100 course in another acquisition field	**TRAINING:** ☐ ACQ 201, Intermediate Systems Acquisition ○ (Desired) One DAU level 200 course in another acquisition career field Intermediate-level management and leadership training (Not currently provided by DAU)	**TRAINING:** ☐ Complete ONE of: PMT 301 Program Management Course PMT302 Advanced Program Management

Cost estimators in the DoD fall under the Business Cost Estimating (BCE) category under DAU. Table 3 summaries the courses required for the three certification standards for cost estimators. Courses are one of the requirements need to meet the certification requirements for each level. The courses required include both online and classroom classes. As an example, the current Level III DAWIA certification standard for 65W Division Chiefs according to DoD Directive 5000.52 includes:

a. Experience

Four years of acquisition experience in BCE and Financial Management (FM)

(Desired) An additional four years of acquisition experience in BCE and FM

b. Education

(Desired) Baccalaureate degree with 24 semester hours in accounting, business finance, law contacts purchasing, economics, industrial managements, marketing, quantitative methods, and organization and management

(Desired) Master's Degree

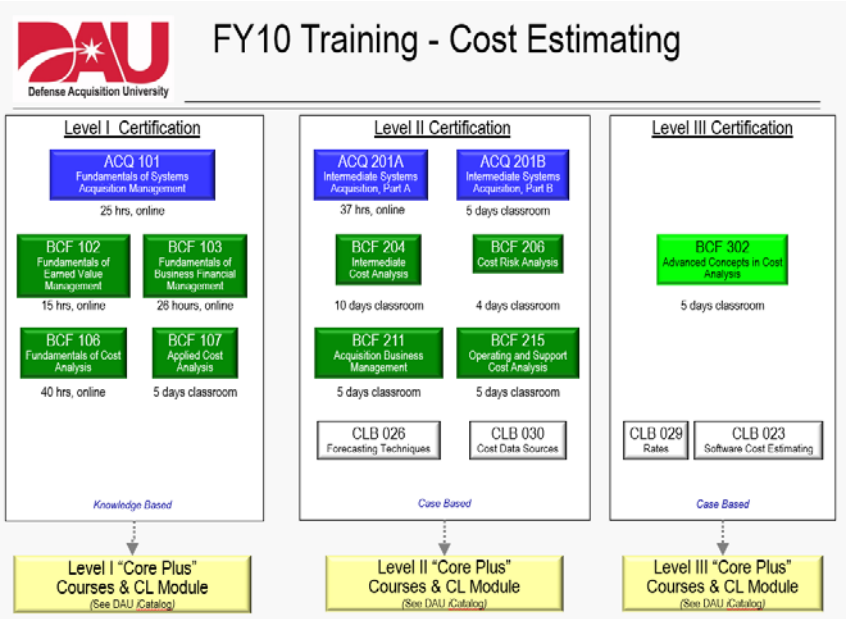
c. Training

1. One advance (Level III) DAU course in BCE and FM

2. Complete at least one DAU course if not previously taken in the following areas: CPM, cost analysis, or, contract finance

(Desired) One advance level (Level III) DAU course in program management

Table 2: Defense Acquisition University Cost Estimating Certification



National Defense Authorization Act

The National Defense Authorization Act is the series of United States federal laws specifying the annual budget and expenditures of the United States DoD. The first NDAA was

passed in 1961 and is one of two yearly bills that the United States Congress oversee defense budgets.

The National Defense Authorization Act (NDAA) of 2007 established a goal for the DoD to perform cost estimating by full-time employees or members of the Armed Forces. The National Defense Authorization Act of 2007 stated, "The Secretary of Defense shall provide for the preparation of an independent estimate of the anticipated costs of systems development and demonstration with respect to the Future Combat Systems" (NDAA 2007). As a result, the Air Force Under Secretary of Acquisition directed the service to identify current capabilities and ensure retention of the support capabilities currently completed by contractors.

The NDAA established the goal for the DoD to ensure that within five years of enactment that key positions, to include cost estimator positions, are performed by a properly qualified member of the Armed Forces or full-time employee of the DoD (NDAA 2007). A qualified member must perform the cost estimate for each major Defense Acquisition Program (MDAP) and each Major Automated Information System Programs (MAIS).

Opposition to DAWIA

Strong evidence was presented that DAWIA has not led to the reduction in cost overruns, but has played a role in fostering non-trivial cost overruns in both procurements and Research and Development contracts. Smirnoff & Hicks 2008 evaluated how defense budget instability, consolidation of the defense industry, acquisition reform, war, and cost estimating error are related to cost overruns in major DoD acquisition projects from 1979 to 2002. The researchers employed a panel model of service specific cost overruns, with fixed effects, and found funding instability in O&M and R&D budgets had large impacts on procurement cost overruns. Smirnoff & Hicks 2008 analysis resulted in positive correlation between DAWIA and cost overruns. In

fact, they found that DAWIA resulted in 2.7 and 3.8 percent increase in cost overruns in procurement and R&D respectively (Smirnoff & Hicks 2008). (It should be noted that this was a correlation study, and does not indicate causality).

Chapter III. Methodology

Research Design and Methodology

The objective of this research was to develop a deeper understanding regarding the knowledge, skills, and abilities of cost analysts in the Air Force financial career field. To answer the questions presented in Chapter 1, the researcher employed a qualitative approach to study the subject in detail because it offered the flexibility to discover new benefits, solutions, and recommendations. Qualitative content analysis will be used to tie together information from the interview responses. Data will be primarily drawn from semi-structured interviews.

Qualitative Research

To fully understand the knowledge, skills, and abilities needed by cost analysts in the field, the researcher used qualitative research approach. The advantage of qualitative research is the data being gathered. Qualitative content analysis was selected as the preferred research method because it is described as a method to classify written or oral materials into identified categories of similar meanings (Moretti et al., 2001). Qualitative content analysis can also be referred to as, "a research method for subjective interpretation of the content of text data through systematic classification process of coding and identifying themes or patterns" (Hsieh & Shannon, 2005, p. 1278).

Interview Questions

According to Yin in his series *Case Study Research*, the focused interview utilizes semi-structured questions for a short (about an hour), single interface. This research relied on in-depth interviews as the data collection method. According to Yin (2003), the most important condition is the type of research questions being asked. The type of research questions is based on the categorization scheme of who, what, where, how, and why (Yin, 2003). Research questions that

focus mainly on “what” lend themselves towards two possible research strategies. The first type of “what” question is an exploratory as this type of question is a justifiable rationale for conduction an exploratory study (Yin, 2003). The second type of “what” question is a form of a “how many” or “how much” line of inquiry, this is likely to favor survey or archival strategies than others (Yin 2003).

Interview questions were generated from previous research conducted by Thompson in 2013. Thompson (2013) analyzed the knowledge, skills and abilities needed among the logistics officer corp. The research built from the list of questions used by Murphy and Poist, including Thompson 2013, to measure skill level requirements of senior-level logistics executives in their initial study (Murphy & Poist, 1991) then again 16 years later. The study was conducted years later to track changes in priority skills required in a new era of logistics (Murphy & Poist, 2007).

Questions were formulated to move from broad scope training and education down to directly addressing knowledge, skills, and abilities needed in the foreseeable future. Before use, AFIT faculty reviewed the questions academically for validity; next, the sponsoring agency approved their use and confirmed these would provide adequate coverage of desired information. Table 3 includes the questions that were asked during this study.

Table 3: Interview Questions

Interview Question Number	Interview Question
01	Based on your experience in the cost career field, what bachelor’s courses would you recommend people take if they are pursuing a career in cost? Why?
02	Currently new entrants into the cost career field are required to have a bachelor’s degree and no other educational requirements. Should the cost career field require a Science, Technology, Engineering or Math (a.k.a. “STEM”) degree (e.g. Industrial Engineering, Operations Research, Applied Math, etc.)? Why or why not?

03	What master degree programs are most beneficial to the 65W career field? Why?
04	Have there been any previous certificates and/or additional courses you have taken that have benefited you in your cost career? If so, which certificates and/or additional courses and why?
05	What types of business skills do 65W officers need to be successful in the USAF? Why?
06	What types of cost knowledge do 65W officers need to be successful in the USAF? Why?
07	What Knowledge, Skills, and Abilities do we currently need in the cost career field, but lack and/or do not teach well? Why?
08	What Knowledge, Skills, and Abilities will the 65W career field need in the foreseeable future that are not developed today? Why?
09	In your experience, can you remember an instance in which a new cost analyst either had the right skillset for the job or did not? What happened?
10	Thank you for your time today. Are there any additional thoughts or concerns you wish to address?

Interview questions attempted to address the objective questions identified in Chapter 1. The four objective questions were directly answered through nine interview questions. Table 4 portrays the relationship between the interviews and the objective questions. Question 9 asked the cost analysts to tell a story in which a new cost analyst either had the right skillset for the job or did not. This question allowed the researcher to have additional evidence to justify the objective questions.

Table 4: Relationship Between Objective Questions and Interview Questions

Objective Question	Interview Question
1	1/2/3/4+9
2	5/6+9
3	7+9
4	8+9

Population

The goal of this research was to provide the best representation of the Air Force cost community's opinions within the period of this study. To do this, the interviews were developed to be conducted at key acquisition-heavy bases. At these bases, various cost analyst units were serving in multiple mission sets. Table 5 displays the locations units who participated in the interviews. Of note, the researcher did not travel to every duty location and telephone interviews were conducted at all the locations.

Table 5: Acquisition Base Locations

Air Force Major Acquisition Bases	**MAJCOM**
Los Angeles Air Force Base	Air Force Space Command
Wright Patterson Air Force Base	Air Force Material Command
Hanscom Air Force Base	Air Force Material Command
Air Force Cost Analysis Agency	Air Force Headquarters Command
Andrews Air Force Base	Air Force Headquarters Command

For each of the locations, the researcher conducted interviews with Air Force cost analysts who met the requirements. The two requirements for participants in this study were at least four years of cost experience and no more than two years since their last cost assignment. This requirement was set because the Air Force has set certification requirements for cost analysts in desired positions. A Defense Acquisition University (DAU) Business Cost Estimating Level II is a minimum requirement for cost chiefs or equivalent in the Air Force and requires, "4 years of acquisition experience in cost estimating" (AFOCD 2016).

All the individuals interviewed seemed interested in the research, were eager to see the results, and volunteered to participate. With the permission of the participant, interviews were

digitally recorded to aid in data retention and transcription. Participants were assured that no personal or identifying information would be revealed without their permission. Each cost analyst interviewed were asked general background information; age, rank, number of years of cost experience, duty location, job title, undergraduate location, and undergraduate major. Each analyst was also asked the same ten questions regarding cost analysts knowledge, skills, and abilities. There were many analysts that included an example in which an analyst had a favorable skillset or an analyst had an unfavorable skillset which allowed for better understanding of the skillsets desired in the Air Force at the program office level.

Coding the Data

The advantage of qualitative research is the data being gathered. However, the data needs to be interpreted and coded in a valid and reliable way (Moretti et al., 2001). When analyzing interview results the researcher had the choice between two main coding options; the inductive content analysis approach, or the deductive content analysis approach (Moretti et al., 2001). With inductive content analysis coding, categories are derived directly and inductively from the data. Deductive content analysis is a more structured approach in which categories are developed through relevant research findings (Moretti et al., 2001). Based on Hsieh and Shannon, inductive content analysis should be used when "existing theory or research literature on a phenomenon is limited" (2005). Because there was limited research conducted on the knowledge, skills, and abilities of cost analysts in the field, inductive content analysis was selected. Coding was conducted with a inductive approach and codes were assigned to words or phrases from the interviews themselves.

Concept Mapping

Concept maps were used to visually represent the responses. Concept maps help researchers display an "organized, compressed assembly of information that permits conclusion drawing and action" (Miles& Huberman, 1994). The concept maps help researchers to maintain the meaning of the interview within the data analysis. Often when looking at an interview transcript, the meaning of the participants responses can be lost. The interconnections displayed on a concept map can visually represent the interview data more clearly than interview transcripts.

Summary

This chapter introduced the basic principles of Qualitative Content Analysis and provided an explanation as to why it was used in this study. The development of the interview questions was also discussed along with the relationships to the objective questions. Inductive coding was also described as the preferred method of coding the data and concept mapping was described as how the data will be presented. Chapter IV will go through the responses to the interview questions.

Chapter IV: Analysis Results

Responses

The ideal goal of this research would be to get inputs from the entire population of cost analysts in the Air Force in order to fully understand the requirements. However, due to time and fiscal constraints, only ten interviews were conducted. Interviews were conducted at Los Angeles Air Force Base (LA AFB), and at the Air Force Cost Analysis Agency (AFCAA). Due to high turnover rates of officers at each base and the number of years in the Air Force, it was assumed participants at both bases would include some personnel with experience at a variety of acquisition units.

Interviews were conducted over the phone with participants at Los Angeles Air Force Base and the Air Force Cost Analysis Agency. Ten interviews were conducted during the period between December 2017 and January 2018. Interviews lasted between twenty minutes and forty minutes. Each cost analyst interviewed was asked the same nine interview questions in a semi-structured interview format. Responses were recorded and then transcribed into a text file. The break out of the participants are in Table 6.

Table 6: Cost Analyst Location Breakout

Location	Participants
Los Angeles Air Force Base (LA AFB)	8
Air Force Cost Analysis Agency (AFCAA)	2

The cost analysts interviewed ranged from Captains to GG-14 currently serving at AFCAA. The cost analyst rank breakout is in Table 7. The cluster of participants between the rank of Captain and GG-14 employees is expected because the cost analyst must meet the requirements for participation in the research.

Table 7: Cost Analyst Rank Breakout

Rank	Participants
Captain, USAF	2
Major, USAF	1
GG-13	3
GG-14	4

The interview results were analyzed through a qualitative analysis tool, ATLAS Ti, and each of the responses were coded based on the researcher's interpretation of the responses. Coding phases and words were identified based on the responses and which phases or words best aggregate the answer to the question. While some participants included many responses to a single interview question, some cost analysts interviewed had very brief responses to the questions. To gather the most data, many codes were used in a response if it helped encapsulate the answer. None of the phases or words were double coded, that is, each phrase or word was associated with a single code. For example, one interview stated, "So definitely I would do heavy statistics. Heavy operations research, so I would definitely do those two for sure." (Appendix 1, Interview 5) and would be coded "Q01 Statistics" and "Q01 Operations Research" to indicate that it was the first question and that statistics and operations research were identified.

Interview Question Results

The following analysis identifies each cost analysis response to the nine interview questions. As identified in Chapter III, each interview question(s) correlates to an objective question. Table 5 displays the interview question number that answers the objective questions. Interview question 9 relates to many objective questions because the question asks the cost analyst for an experience in which a cost analyst had either the right or wrong skillset and what occurred. Table 8 lays out the demographics of each cost analyst along with the codes associated

with their responses. Next, each interview question was coded and all ten responses were analyzed in a concept map.

Table 8: Interview Results

	Demographic Information				Interview Questions							
Interview	Age	Rank	Duty Location	Undergraduate Major	Q01	Q02	Q03	Q04	Q05	Q06	Q07	Q08
1	35	GS-14	LA AFB	Management	Mathematics, Operations Research	STEM Degree: Required, Technical Skills	AFIT or NPS, Finance, Engineering Degree	APDP: No Value, ICEAA Cert,	Critical Thinking/ Communication	CER Knowledge, Budget Knowledge, Program Engineering (Bigger Picture)	Understanding what the budget team does, CBT: No Value	Communicating to Upper Leadership
2	36	O-4	LA AFB	Aviation Business and Administation	Statistics, Mathematics Math Degree, Management, Systems Engineering, Any Engineering Courses	Master Degree Program Required	Math Masters Degree, Engineering Degree	Leadership PME course, CDFM: no value, CEBOK	Critical Thinking/ Communication	CER Knowledge, Budget Knowledge, Procurement Knowledge	Budget: Phasing Dollars, Cooperation Between Budget and Cost	Phasing Knowledge
3	43	GS-13	LA AFB	Computer Science		STEM: Not Required, Math or Statistics: Desired	Engineering Degree, Mathematics, AFIT or NPS	AFIT Courses, BCS Courses	Critical Thinking/Communication, Interpersonal Relationships	CER Knowledge, Communication	System Engineering	Standard Acquisition Program
4	27	O-3	LA AFB	Finance	Motivation in the Career, Statistics Cources	STEM: Not Required	AFIT or NPS, Basic Cost Knowledge, Engineering Degree, Operations Research	CEBOK, ICEAA Cert	Critical Thinking/ Communication, System Thinking, Budget Knowledge	System Thinking, Business Management, Technical Knowledge	Systems Engineering	Motivation, Critical Thinking/ Communication
5	31	O-3	LA AFB	Business Management	Business Management, System Engineering, Statistic Cources, Understanding Big Picture	Current Climate Note: STEM Degree: Required	Any Degree: Analytical Tool Set, AFIT or NPS	ICEAA or CDFM: No Value	Negotiation, Critical Thinking/ Communication, Attention to Detail	System Thinking, Business Management, Technical Knowledge	Contracting Knowledge, Engineering, System Engineering	Software Development
6	38	GS-13	LA AFB	Mathematics	Statistics, Operations Research, Model Building, Communication	STEM: Not Required, Acquisition Training	Any Degree: Analytical Tool Set, AFIT or NPS, Finance Masters	PMI Cert	Systems Thinking, Integration Skills	Only if you are Building the Model, Cost Software Knowledge	Acquisition Experience/Training, Feedback	Frequent Feedback
7	36	GS-13	LA AFB	Applied Mathematics	Statistics, Engineering	STEM Degree: Required	AFIT or NPS, MBA: Value Added	ICEAA Cert: Value Added	Critical Thinking/ Communication	Collect and Normalize Data, Budget Knowledge	Cost Estimating Software Tools	Cost Estimates Done by Government, Technical Skills
8	30	GS-14	AFCAA	Business	Math Degree	STEM: Desired, Business Degree	Math Masters Degree, Statistics Degree, Economics	ICEAA Cert: Value Added	Critical Thinking/ Communication	ICEAA Cert Knowledge	Statistics	Critical Thinking/ Communication
9	42	GS-14	AFCAA	American History	Statistics, Physics, Management, Leadership, Communication	Math or Statistics: Desired, Engineering Knowledge	AFIT or NPS, Engineering Degree, Math Degree	ICEAA Cert: Value Added, CDFM Cert: Value Added	Problem Solving	Communication, Cost Software Knowledge, Basic Math Skills	Cooperation Between Cost and Budget, Budget Cycle	On the Job Training
10	30	GS-14	LA AFB	Finance	Engineering Degree, Statistics, Math Degree, Operations Research	STEM Degree	Engineering Degree	None	Critical Thinking/ Communication	Technical Knowledge, CER Knowledge	Specialized Cost Knowledge	Political Knowledge Developing CER: Historical Data

Q01. Based on your experience in the cost career field, what bachelor's courses would you recommend people take if they are pursuing a career in cost? Why?

The concept map in Figure 4 illustrates the responses relating to interview question 1. Out of the ten interviews, there were eight responses of recommendations of statistic courses, and five responses on math degree courses. This is due to "being able to understand the numbers and do the number crunching," (Appendix 1, Interview 8). Leadership and business management were also mentioned by many participants. There were no definitive answers given as there was not a consensus that one course or courses were preferred, however many of the responses did highlight the need for engineering classes to better understand the technical requirements of cost estimates.

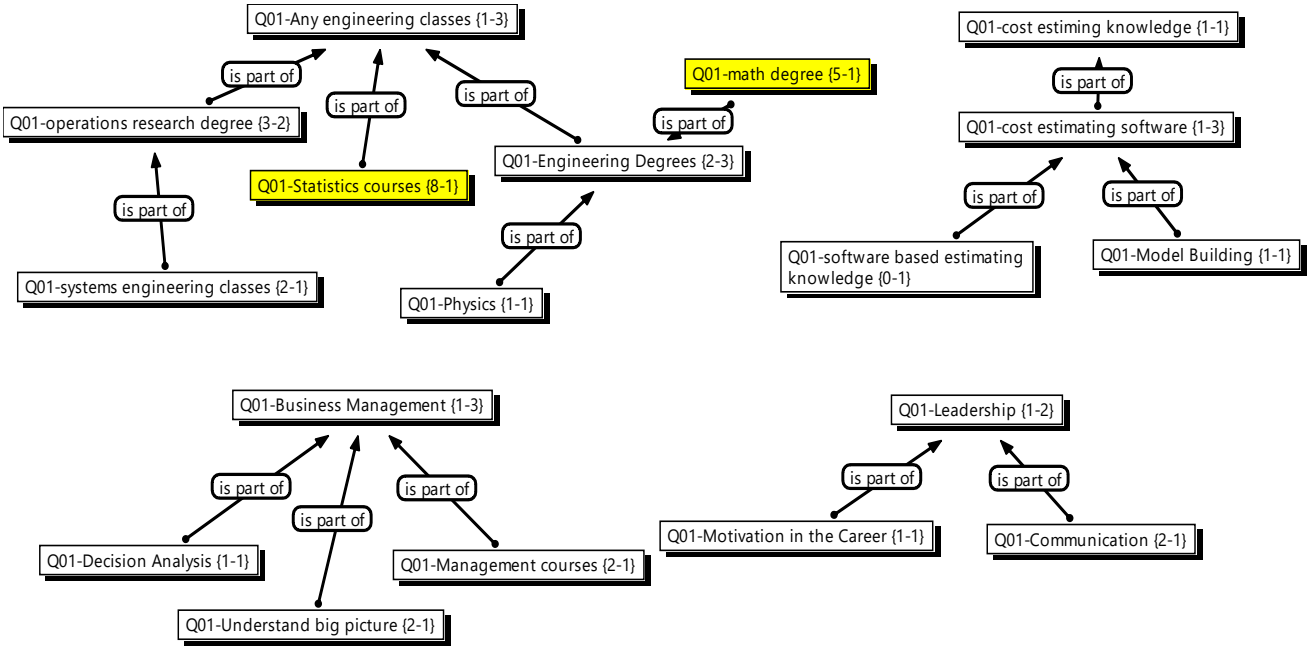


Figure 4: Q01 Concept Map

Q02: Currently new entrants into the cost career field are required to have a *bachelor's degree* and no other educational requirements. Should the cost career field *require a Science, Technology, Engineering or Math (a.k.a. "STEM") degree* (e.g. Industrial Engineering, Operations Research, Applied Math, etc.)? Why or why not?

By asking about the requirement for a science, technology, engineering, or math (STEM) degree, the researcher attempted to understand if cost analysts in the field should require a STEM degree or alternative degree requirement. Even though a consensus could not be realized with the responses, seven of the analysts did favor a STEM degree. In addition, there were only two of individuals that identified that a STEM degree should be desired, but not required. One analysis did identify that the current climate of the Air Force should also be considered. They made the comment that the cost analysis career field does not have the privilege, at the current climate, to pass up applicants to the field. Figure 5 shows the concept map of the responses to interview question 2.

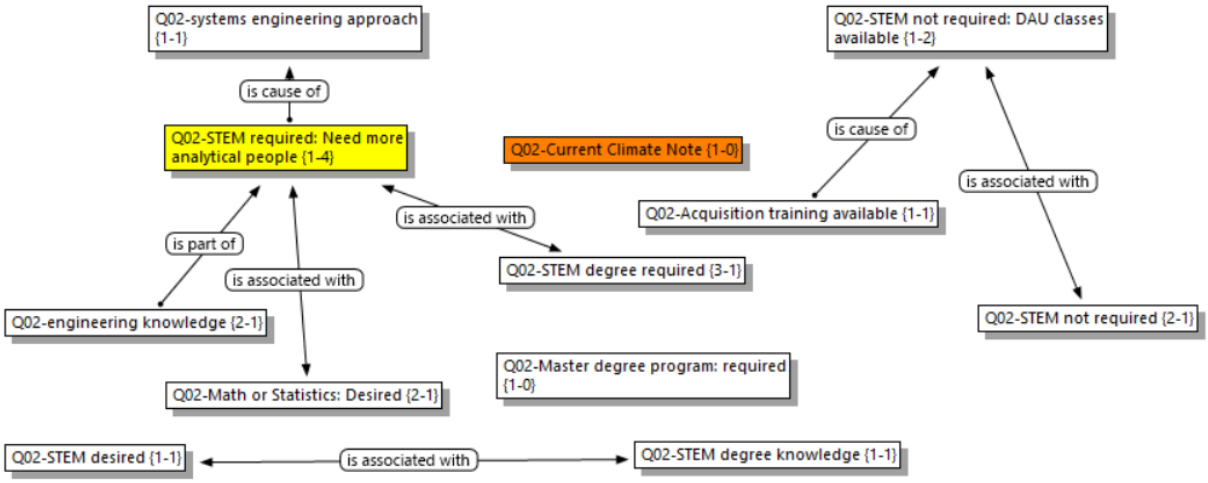


Figure 5: Q02 Concept Map

Q03. What *master degree* programs are most beneficial to the 65W career field? Why?

Engineering degree and either a degree from Air Force Institute of Technology or Naval-Post Graduate School where identified by 80% of the responses as desired master degrees that would benefit the cost career field. The AFIT or NPS degree was most identified by responses because of the specialized cost analysis degree offered at either school. Figure 6 is a visual

representation of the ten interviews responses. The engineering degree involved understanding the system engineering knowledge, operations research, and having an analytical tool set available to the cost analyst. Of the two participants who completed MBA programs, one reasoned that their degree benefited them while the other did not. The individual that benefited from this or her MBA stated that it helped cost analysts understand "how you structure business problems" (Appendix 1, Interview 5). An MBA was not mentioned as much as the AFIT or NPS degree because an MBA did not offer the specialized training offered at the other master degree programs.

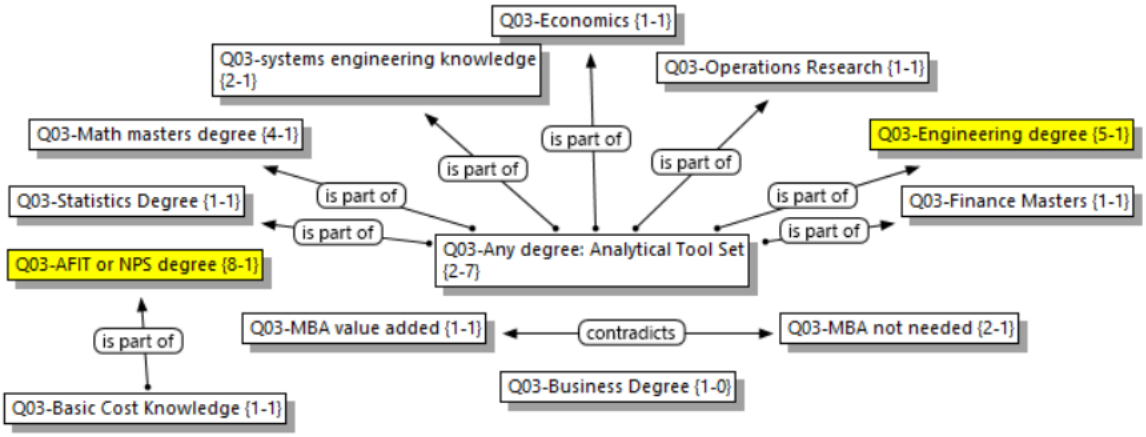


Figure 6: Q03 Concept Map

Q04. Have there been any *previous certificates and/or additional courses* you have taken that have benefited you in your cost career? If so, which certificates and/or additional courses and why?

Figure 7 shows the differences in responses from either "ICEAA cert value added" to ICEAA and CDFM no value." The main response, given by 60% of the participants, was that the ICEAA, also referred to as the CEBOK, exam added value to the cost career. The ICEAA exam was identified by many cost analysts because, "it forces you to study" (Appendix 1, Interview 3), and it is, "statistic based and it requires you to do hand calculations" (Appendix 1,

Interview 7) which benefits cost analysts in the field. In addition, you "won't be able to pass the exam if you do not study the material" (Appendix 1, Interview 7). The ICEAA exam is also, "good commitment to the career field" (Appendix 1, Interview 1) because it requires the knowledge of how to do calculations by hand and explain. The CDFM is a certificate with knowledge questions about the budget side of the financial career field. Budget knowledge was identified as a concern that many cost analysts fail to incorporate into their knowledge used during their career.

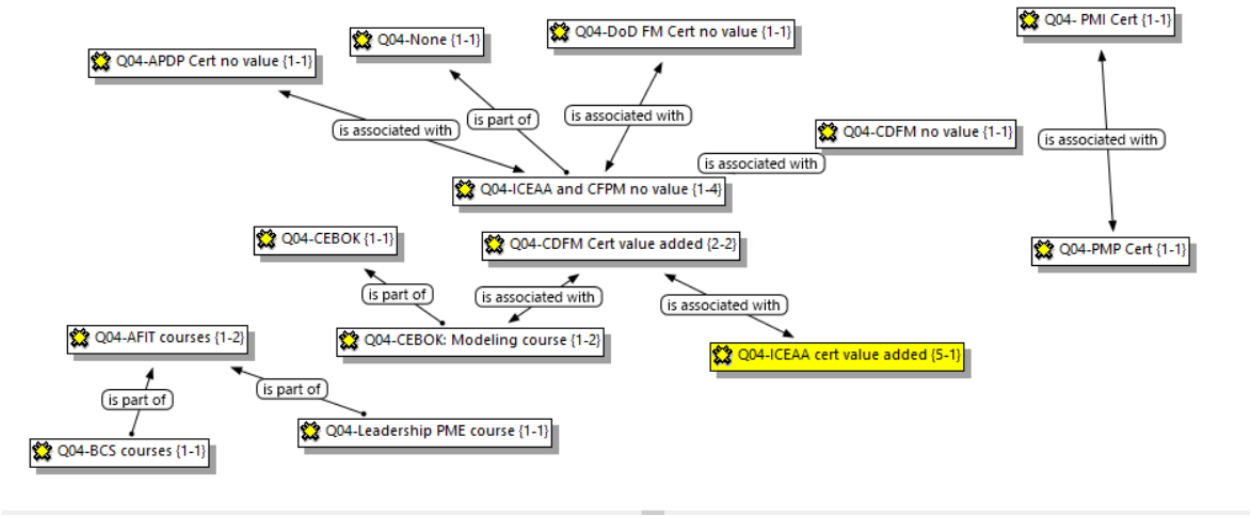


Figure 7: Q04 Concept Map

Q05. What types of *business skills* do 65W officers need to be successful in the USAF? Why?

To identify business skills needed by the cost career field, the overwhelming response was critical thinking and communication skills. When cost analysts are creating a cost estimate, communication is needed between all the different stakeholders in the estimate. The technical team, engineering team, program manager, and the financial management team need to be in constant communication to create a reliable and defendable cost estimate. A systems thinking

approach allows cost analysts to, “understand the bigger picture of what we do” (Appendix 1, Interview 1). Figure 8 displays the concept map for the responses from the interview question 5.

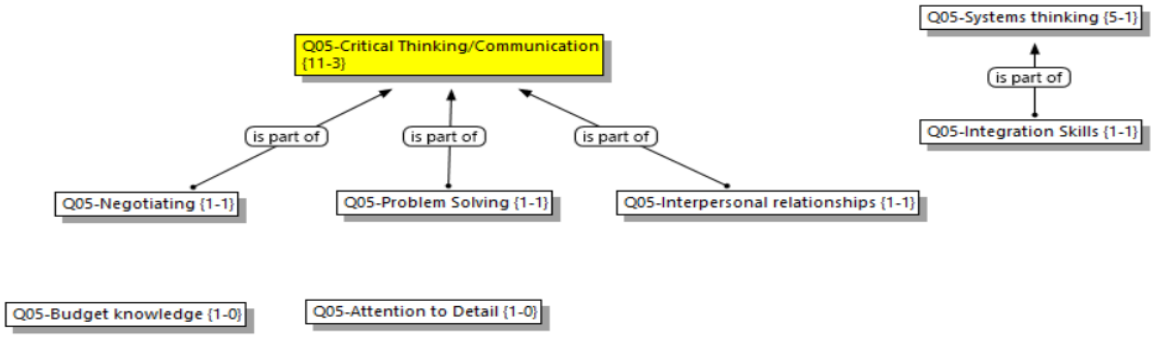


Figure 8: Q05 Concept Map

Q06. What types of *cost knowledge* do 65W officers need to be successful in the USAF? Why?

The cost knowledge needed by the career field represents the hard skills desired by analysts. Cost analysts interviewed identified success in their own ways. Based on the responses by the ten cost analysts, the knowledge needed was the knowledge tested in the ICEAA certification. This includes how to collect and normalize data, cost estimating knowledge, and the cost estimating software needed in the field. There were also mentions of the need for cost analysts to have communication skills to understand the technical knowledge. Figure 9 displays the concept map for the responses, highlighting that the ICEAA certification knowledge would be the desired cost knowledge. One response detailed the need for cost analysts to have, “more technical knowledge if you’re the one who’s actually building the models” (Appendix 1, Interview 5). Another cost analyst recommended that cost analysts assigned to a system program office should have “some kind of in-depth knowledge” (Appendix 1, Interview 9) to understand the technical attributes of the system.

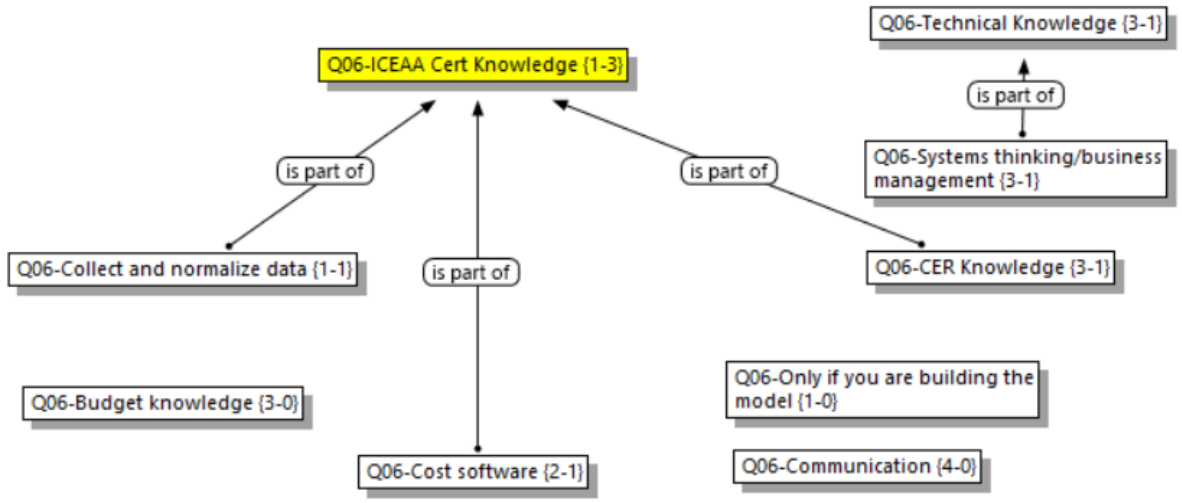


Figure 9: Q06 Concept Map

Q07. What *Knowledge, Skills, and Abilities* do we *currently need* in the cost career field, but *lack* and/or do not teach well? Why?

The main identified current need for cost analysts in the field is an understanding of systems engineering. This includes both understanding the budget side of the estimate and incorporating the schedule risk assessment into the estimate. By also understanding the contracting knowledge and the budget cycle, cost analysts can fully understand the use of "schedule risk assessment to be able to put factor on the project" (Appendix 1, Interview 10) and how it is better to use schedule risk assessment (SRA) instead of actuals if the program is still working to be completed. Figure 10 illustrates the responses given by the cost analysts. While there was no consensus of knowledge, skills, and abilities needed currently in the Air Force, there was still a variety of responses. One cost analyst stressed the need for analysts to understand the different cost estimating software tools available and understand the strengths and weaknesses of each. This includes understanding the "black box" effect of the software tools and fully realizing that equations and functions are going on in the background of the software. There was also a need for more acquisition experience and training in order to understand the process of procurement.

This also relates to understanding contracting knowledge and how Air Force programs are put on contract.

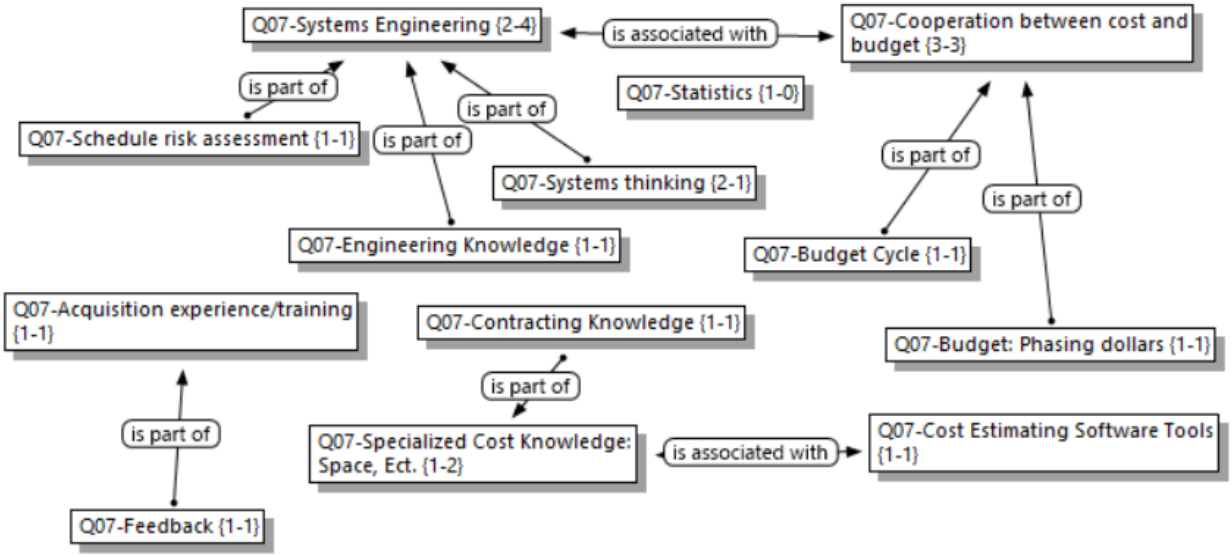


Figure 10: Q07 Concept Map

Q08: What *Knowledge, Skills, and Abilities* will the 65W career field need in the *foreseeable future* that are not developed today? Why?

Figure 9 displays the knowledge, skills, and abilities identified by the ten cost analysts needed in the foreseeable future. There were many responses from the analysts that indicated that critical thinking and communication will become a necessity in the future of the career field. Figure 11 also justifies the conclusion that communication and critical thinking were the most desired skill needed in the foreseeable future. Through communication, it was also cited that cost analysts need to understand the political bureaucracy to effectively communicate cost estimates to the project manager and provide leadership with the knowledge needed to make informed decisions. One cost analyst also made the comment that there are no specific skills or abilities needed in the future, but rather it is the “motivation to learn” that is needed to be developed. However, the analyst did not offer a solution on how to increase the motivation.

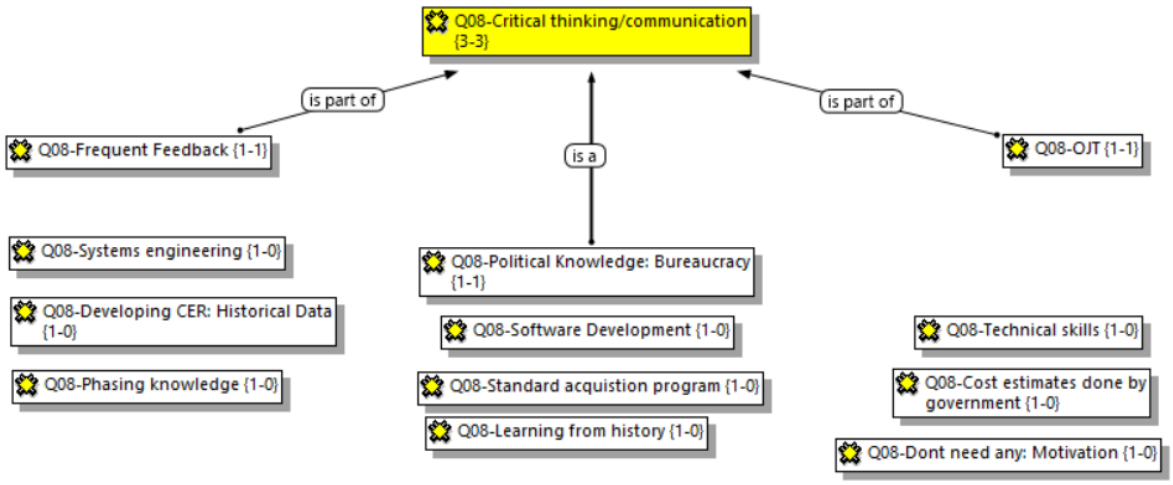


Figure 11: Q08 Concept Map

Q09: In your experience, can you remember an instance in which a new cost analyst either had the right skillset for the job or did not? What happened?

Interview question 9 had cost analysts identify a situation in which a new cost analyst was either prepared or not to accomplish their mission. While there were a wide range of responses from being prepared to not being prepared at all, the responses did help to justify and provide examples for the other eight interview questions. One cost analyst made the comment, "Well nobody ever fails, we don't give anyone the ability to fail because we have resources here to get guided along the way. We have like new AFIT grads here who have knowledge of cost, but don't know how to apply that to a cost model, but we have SMEs who can walk them through an estimate and give them the background need to succeed, even though they might not fully understand the program when they arrive." (Appendix 1, Interview 10). This encapsulates most of the responses in which new cost analysts that are not prepared, still succeed based on the support provided to them once they enter the field. This is also reiterated by one analyst who received a new cost analyst who had a computer engineering degree and was able to succeed

even though, “He didn’t know the (computer) language, but he understood the concepts” (Appendix 1, Interview 6). However, there was one response that indicated they knew of a new cost analyst who did not understand how to use risk in a cost model and how to develop CER’s, they stated that the person, “struggled and they struggle to this day” (Appendix 1, Interview 8). Another cost analyst experience, early in their career, a new government civilian who, “didn’t understand Excel or PowerPoint. They didn’t have the basic, kind of building blocks, that you need…” (Appendix 1, Interview 5). This lead to the analyst not being able to succeed and was eventually moved into a new position.

Chapter V: Conclusion and Recommendation

Overview

The overall purpose of this study was to analyze the knowledge, skills, and abilities needed by Air Force cost analysts in the present and in the foreseeable future. In doing so, this study developed interview questions using previously validated questions to obtain responses that may develop a recommendation for the knowledge, skills, and abilities needed by cost analysts in the field.

Two acquisition heavy bases were contacted and interviews were conducted resulting in ten responses. From these responses, qualitative analysis was conducted using an online qualitative analysis tool. Relationships were developed between the ten responses and connections were identified. This chapter presents conclusions, implications for the Air Force, and recommendations for future research based on the analysis of the data.

Objective Questions Results

Using the responses given from each interview question, the research team attempted to answer the objective questions. The first objective is as follows:

Q1. What bachelor's courses/master's degree programs/certificates/online courses are beneficial to the cost career field?

As discussed in Table 7, interview questions 1, 2, 3, and 4 are directly related to objective question 1. Ideas from each of the interview questions can be combined to create a majority answer. Interview question 1 identified that statistic courses and additional courses in leadership through either business management or decision analysis would allow the cost analyst to bring increased knowledge and skill in cost estimating knowledge and cost estimating software. The

consensus identified in Figure 5, shows that a STEM focused degree, or equivalent, would be desired to be successful in the cost analyst career field. The overwhelming master degree programs recommended were either AFIT or NPS cost degrees. These two degrees specifically focus on cost estimating knowledge and allow graduates to reenter the career as an analyst with cost estimating terminology and an analytical tool set. In addition to the master degree's recommended, the ICEAA exam provided the best general cost knowledge needed by cost analysts in the field. While there was not a conclusive yes or no answer to if the ICEAA exam should be required, the ICEAA exam provides the necessary cost knowledge needed to be successful. In conclusion, new cost analysts should strive to take additional statistics or leadership courses, major in a STEM undergraduate degree, attend either AFIT or NPS, and take the ICEAA exam to benefit the cost career field. The DAU classes were also identified by many of the cost analysts as a way the Air Force attempts to better train them, however the cost analysts did state that the DAU training was not beneficial to the career. Along with DAU courses, the APDP certification is currently required by cost analysts at certain job positions. Unfortunately, all of the cost analysts that mentioned the APDP certification recommended that there needs to be a better way to train cost analysts in the field compared to the APDP certification.

Q2. What are the primary *Knowledge, Skills, and Abilities* required for the cost mission?

Interview questions 5 and 6 related directly to answering objective question 2. Critical thinking and communication were identified as the main skills needed by cost analysts. These skills and knowledge provided by the ICEAA certification are the primary knowledge, skills, and abilities required for the cost mission. Interview questions 1, 5, and 7 identified communication

as a fundamental skill needed by analysts in the field. Being able to communicate with the technical team by, "presenting information, the ability to explain different points to different crowds and audiences because everyone learns differently" (Appendix 1, Interview 7). In addition, one cost analyst stated, "Presenting your results successfully and then also just being able to lead a group of people" (Appendix 1, Interview 8) allows cost analysts to accurately provide decision support to leadership and inform leadership of cost drivers.

Q3. What *Knowledge, Skills, and Abilities* do we currently need in the cost career field, but <u>lack</u> and/or do not teach well?

It was identified that there needs to be more communication between the cost community and the budget community. Understanding the system engineering approach allows cost analysts to fully master each segment within the program office and create better estimate for future systems. A reason for the lack of knowledge and skill is because, "you never have that kind of standing battle rhythm where you can impart these specific knowledge, skills, or abilities on to the team (Appendix 1, Interview 1). Another cost analyst suggested, "more formal training, more systems engineering focused training" (Appendix 1, Interview 2) that would allow cost analysts to understand the technical side of the systems they are estimating. Unfortunately, not all cost analysts in the field have budget experience, but having that open communication with the budget team would allow the analyst to understand the budget cycle and what would be the appropriate way to phase the dollars.

Q4. What *Knowledge, Skills, and Abilities* will the 65W career field need in the foreseeable future that are not developed today?

Interview question 8 attempted to find a common recommended among the cost analysts interview regarding the needs of the cost community in the foreseeable future. Figure 9 displayed the responses coded to represent the knowledge, skills, and abilities needed in the foreseeable future. Critical thinking and communication were again identified as skills needed in the cost community. Communication included frequent feedback within the cost community chain of command (Appendix 1, Interview 5). Systems engineering and technical skills were also identified as skills that need to be developed in the cost community. In addition, an understanding of developing CERs was also recognized because, as one analyst described, "if any problems of program experiences is going to be captured by the raw cost, we then normalize the data and it goes into USCM. We then start to estimate our new programs based on the poor performance of our previous programs" (Appendix 1, Interview 1).

Implications for the Air Force

This study demonstrated the importance of educational requirements within the Air Force cost community. Findings indicated Systems, Technology, Engineering or Math (STEM) degrees should be recommended for applicants to the cost community in order to better understand the engineering knowledge needed to create effective cost estimates. Also, additional courses in statistics should be recommended as an undergraduate prerequisite to better prepare cost analysts to solve analytical problems. Furthermore, the ICEAA certification should be desired by cost analysts to achieve because it provides the best understanding of then needed cost knowledge in the field.

Identifying these recommendations and incorporating them into the recruitment of new cost analysts will provide better understand of cost knowledge and preparation to accomplish the cost analysis missions. The educational recommendations can be used by Air Force military and

civilian cost analyst career managers for evaluating potential analysts, for judging the promotion potential of current analysts, for evaluating current analysts for future assignments, and for evaluating a current analyst's need or request for higher education. The recommendations can also be used by current cost analysts for guiding their education and professional development.

Recommendations for Future Research

The cost analysis field is continuing the change based on the changing size of the Air Force. Future research to either develop a formal educational requirement or the feasibility of an undergraduate cost analysis curriculum would be areas of study invaluable to the field. Also an investigation into the means used to acquire Air Force cost analysts and the policies used to evaluate potential applicants would be worth exploring. Finally, a comparison between the government civilian recruitment process and the Air Force officer selection process to better understand the importance the different knowledge, skills, and abilities needed in the field. The cost analysis career field has continued to develop and improve, and any development in the knowledge, skills, and abilities for cost analysts greatly increases the value as a decision support tool.

Appendix A

Interview Question Guide

Demographic Information

Age:
Rank:
Duty Location:
Unit:
Years of Cost Experience:
Current Job Title:
Undergraduate Location/Major:

Interview Questions

Q01. Based on your experience in the cost career field, what *bachelor's courses* would you recommend people take if they are pursuing a career in cost? Why?

Q02: Currently new entrants into the cost career field are required to have a *bachelor's degree* and no other educational requirements. Should the cost career field *require a Science, Technology, Engineering or Math (a.k.a. "STEM") degree* (e.g. Industrial Engineering, Operations Research, Applied Math, etc.)? Why or why not?

Q03. What *master degree* programs are most beneficial to the 65W career field? Why?

Q04. Have there been any *previous certificates and/or additional courses* you have taken that have benefited you in your cost career? If so, which certificates and/or additional courses and why?

Q05. What types of *business skills* do 65W officers need to be successful in the USAF? Why?

Q06. What types of *cost knowledge* do 65W officers need to be successful in the USAF? Why?

Q07. What *Knowledge, Skills, and Abilities* do we *currently need* in the cost career field, but *lack* and/or do not teach well? Why?

Q08: What *Knowledge, Skills, and Abilities* will the 65W career field need in the *foreseeable future* that are not developed today? Why?

Q09: In your experience, can you remember an instance in which a new cost analyst either had the right skillset for the job or did not? *What happened*?

Q10: Thank you for your time today. Are there *any additional thoughts or concerns* you wish to address?

AFIT IRB Exempt Determination Official Letter

DEPARTMENT OF THE AIR FORCE
AIR FORCE INSTITUTE OF TECHNOLOGY
WRIGHT-PATTERSON AIR FORCE BASE OHIO

26 Dec 2017

MEMORANDUM FOR Dr. David Fass (AFIT/ENV)

FROM: Brett J. Borghetti, Ph.D.
AFIT IRB Exempt Determination Official
2950 Hobson Way
Wright-Patterson AFB, OH 45433-7765

SUBJECT: Determination on exemption request from human experimentation requirements (32 CFR 219, DoDD 3216.2 and AFI 40-402) for "Evaluating Requirements of Cost Analyst", dated 30 Nov 2017.

1. Your request was for exemption based on the Code of Federal Regulations, title 32, part 219, section 101, paragraph (b) (2) Research activities that involve the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior unless: (i) Information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) Any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

2. Your study **qualifies for this exemption** because you are not collecting identifying information or answers to questions which, if the responses were disclosed, could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation. If you make any changes to the list of questions which could result in collecting information leading to the possible identification of participants, please consult with me for a review of the revised questions before continuing your interaction with human subjects.

3. This determination pertains only to the Federal, Department of Defense, and Air Force regulations that govern the use of human subjects in research. This determination is only for the research outlined in the exemption request letter.

12/26/2017

X

Signed by: BORGHETTI.BRETT.J.1009082820
BRETT J. BORGHETTI, Ph.D.
AFIT Exempt Determination Official

Interview Responses

Interview 1

Demographic Information

Age: 35
Rank: GS-14
Duty Location: Los Angeles AFB
Unit: SMC/MC
Years of Cost Experience: Seven years
Current Job Title: Chief of Cost Analysis
Undergraduate Location/Major: USAFA/ Management

Q01. Based on your experience in the cost career field, what *bachelor's courses* would you recommend people take if they are pursuing a career in cost? Why?

I think probably the most of applicable one would either be mathematics or operations research and it really goes back to understanding the data that's coming in and then how you can either manipulate that data, to normalize the data and figure out what information you can clean from it to your cost estimates. So having a management background and undergrad is great because it gives you the bigger picture you look at things a little bit differently, but at same time having more data driven, more analytical undergrad I think would help a lot in the cost career field.

With that math background, do you want them to understand all of the math software associated with it?

Yeah, I mean, because with what we use out here with ACIT, it's all excel base you know. But I think having that knowledge of just working EXCEL and having more than just the basic EXCEL functions; addition, subtraction, multiplication and actually getting into logs, natural

logs, running regression analysis is beneficial. Right now, we're trying to figure out if what's in the USCM database isn't really applicable to what we do at MILSATCOM or can we look at the data behind the CER's in USCM and actually extrapolate and pull out data that's specific to COM satellites and make our own USCM database. Of course, FM is pushing back and telling us that we shouldn't do that. But it's been a real, I mean the group gets together every Friday and it is about two hours of just math talk and how we are going to go about do this. So it is very researched focused and very intense, but having though analytical backgrounds really help.

Q02: Currently new entrants into the cost career field are required to have a *bachelor's degree* and no other educational requirements. Should the cost career field *require a Science, Technology, Engineering or Math (a.k.a. "STEM") degree* (e.g. Industrial Engineering, Operations Research, Applied Math, etc.)? Why or why not?

I think you'd be much better if they required a STEM degree. Just because of the analysis that we do on data and the knowledge behind how to take just raw data and actually put it into a cost estimate and actually make sense of a satellite would cost based on historicals. So it really just benefits an analyst perspective to have those technical skills and I think a STEM degree would provide that, moreover than a just fluff degree. I know some people who have majored like in history and it doesn't necessarily put them behind the power curve with what we do, you can get a sense of the big picture can start to whittle it down but to really get into the weeds and understand what we do, day in and day out, I think a STEM degree would be helpful.

Do you feel like someone with a STEM degree background would be better suited to take control of their programs?

Yes, I've seen this like on deployments. You go to a six month deployment and it takes you 3ish months to get into the job and figure out what you're doing and then you're hyper rolling for maybe two months and then you roll out the last month and you are then done. The same thing here [LAAFB], if we have officers or even junior civilians who come in and you know maybe have a non-technical degree. It just takes them a little bit longer to ramp up. Then the military guys are out here either PCA in a year or a half or PCS in three years. Given the timeline to get fully into a program and understand it, I think having that STEM degree would help quicken that process.

Q03. What *master degree* programs are most beneficial to the 65W career field? Why?

I have the cost analysis degree [AFIT] which I think has been great. I have an M.B.A. and it doesn't really do much, it is a just check the box degree. But, I am in back in school doing a systems engineer master's at LMU and I think either the cost degree at AFIT or NPS or something that's even more technical, maybe on the engineering side would probably help the most. Because it's a core function of what we do for cost but at the same time, I am reaching out to the technical team, the engineers and understanding from their perspective what influences of the satellite cost design and the trades spaces. I think that's probably the best kind of combo you can have. So if you do have a technical, either finance or engineering undergrad; kind of maybe doing the opposite for a master's just so you have that diversification between the two.

Would you like for the individual looking to an engineering degree to focus on the degree that is in the specialty that they are focusing on?

That would be great. The program I am currently on at LMU, it's a space focus system engineering and one class as I just took was a spacecraft design class. We were designing satellites from the ground up which is cool. But either that or something operations research and take it one level higher than electrical engineering or mechanical just because whether you're Hanscom, LAAFB, or AFCAA you're talking about systems and not the electric current between processors on satellite. It is part of it, but what we do is that systems approach and systems thinking.

Q04. Have there been any *previous certificates and/or additional courses* you have taken that have benefited you in your cost career? If so, which certificates and/or additional courses and why?

We are require do the APDP BUS-CE certifications. I don't find any value in that. It's a real check the box type of thing. Part and parcel with that, DoD FM certification, I don’t find value in that either. I do find a lot of value in the CDFM certification and the ICEAA certification. It is really just getting into the core functions of what we do, really in the ICEAA side and just going through that practice in that rigor. You can learn going through the cost degree right now; you learn cost estimating at the top level, but until you actually get into developing CER’s and what we do to complete an estimate, you cannot be ready for that until you're in it. Being in an environment like this [Cost Analysis] and striving for that ICEAA certification just shows that good commitment to the career field. l and it's something that we do that is very beneficial. And on the CDFM side, we don’t do our cost estimates in a vacuum and all of our analyses. We have to work with our budget team and the CDFM is more of a budget focus certification with little acquisition piece in there. So I think that's a good one to say OK, if I'm doing my cost or earned

value analysis and on our program controls side, how does that affect the budget side, getting that bigger perceptive.

Q05. What types of *business skills* do 65W officers need to be successful in the USAF? Why?

I think critical thinking, communications, and having a system thinking or systems thinking approach to your work. And how this is understanding the bigger picture of what we do.

With communication, is it having communication with the engineers and all the parties involved and making sure they all have some input in your estimate?

We all support the program manager and we are a supporting member of the integrated product team. So each of the disciplines within the I.P.T. they all speak a different language. We can sit here and talk about whats going on in C E R.'s and all the acronyms we throw around every single day and if you talk to an engineer you're going to get deer in headlights. I think just building those communication skills to focus on and what you want to say at the appropriate level is a difficult concept to master but one that is very important. At the action officer level for instance, there going to be in the weeds with acronyms talk about cost estimating meaning in X. Y. And Z. But then you roll that up to a director or the PEO level then you don’t need to get into the weeds. Just understanding the various levels of communication, what to communicate what to not. Then also having that systems thinking approach and getting outside of what we do in a silo and actually and how your business affects the bigger picture. I think that's a trait that all officers should have and civilians as well. By the difficulty I've had here in this job, since I arrived was getting out of that mentality of looking out of my microscope and this is all I do and I don't see what is going on the outside. That’s why I have asked all the officers and the younger

civilians to get out and talk to your program and don’t come to me for answers and take that bigger picture approach.

Q06. What types of *cost knowledge* do 65W officers need to be successful in the USAF? Why?

At least a understanding of how cost estimates affect programs and within the P.P.B.E process the importance of a single best estimate for instance or service cost position. Understanding that cost estimates are only as good as the day they're made. That you are going to be updating those and consistent basis and knowing all the inputs that go into it and the reasons why there are trade-offs to be made. Also when the program manager gives a different direction and what skills you need to use to go with that different direction are the valuable cost skills to have. I mean it's easy to do a quick turn estimate, kind of wave your hand at a rule of thumb, but when you actually have to go up and start defending estimates in front of the PEO, AFCAA, or OSD and they are actually setting budgets off these estimates, you know it would behoof somebody to know as much as they can about it. They are some of the softer cost skills that you don't learn from a degree program or an ICEAA certification. It is just the way we manage business and conduct our daily business. Understanding where we fit in the bigger picture of the entire acquisition cycle.

You stated that it is a good idea to get inputs, but is it also a good idea to be able to communicate where you got the inputs at a higher level?

Yes, we always had to fight with you know program managers or you know anybody else towards you the estimates too high. Yes the estimate is high, but it is high for a reason and you really have to understand the driving factors and the inputs to that and so understanding that language and be able to explain it to somebody you know I think that's an art that is that is a

tough one to grasp. It is also something that just needs practice. Its easy to say, well you know it's the number and that’s our CER and you can just follow your laurels and say that's it. However, if you know of money's tight or there's a disconnect between what our estimate and what the current budget is, we need to understand the driving factors and be able to explain that because at the end of the day it's all about dollars.

Q07. What *Knowledge, Skills, and Abilities* do we *currently need* in the cost career field, but *lack* and/or do not teach well? Why?

I would say that something that we don’t teach well is the synchronization of what we do in cost and what the budget team does with budget. And I'm seeing this become more and more as I get into this role of we're still kind of siloed off you know? We're we're good at it at the F.M. career form level but once you actually start looking at the specific disciplines, cost you know having cost as main schedule analyses, earned value analysis. Understanding how all those different things work together and I think it's that system a systems approach that I think probably needs to be taught a little bit better. Some of the skills that we do are just difficult and they're tough to teach and especially when you have you know everything else from a workforce perspective going on with PCAs, PCS’s, and deployments; you never have that kind of standing battle rhythm where you can impart these specific knowledge, skills or abilities on to the team and then somebody leaves and you can have to reset the clock and do it over. So having that knowledge of what we do and how it affects others I think can be taught better. You know for some of the certifications we do you know what we learn through DAU and the DoD, it's difficult for me just figure out how to use the Web sites, let alone what I learn. If we can get out of the CBT type learning environments and actually leverage about something that's more collaborative or face to

face that doesn't need to be weeks on end long. I think you could probably tackle some of the issues that we're experiencing and actually teach cost officers and cost civilians some of those KSAs that we need in the crew field that you cannot sort of learn online, but they're kind of forced you to learn like that now.

Q08: What *Knowledge, Skills, and Abilities* will the 65W career field need in the *foreseeable future* that are not developed today? Why?

I think are the biggest one is kind of taking the step further from what we learned years ago with should cost. I mean some programs we are estimating now are just grossly expensive and then when you start thinking about we're just those small piece of the bigger SMC, AFSPACE, Air Force, DoDs, Federal Government perspective. I don't know how we're going to be sustainable for the future with the systems that we want, the capabilities we want. I think that it is that critical thinking and really going against the paradigm the way we've done estimates before which is rehashed years later and our systems will just be getting more expensive more expensive. Just like the self-licking ice cream cone prophecy that you know if it's expensive ten years ago it seemed more expensive now in twenty years now it's going to be the same thing. I just don't know where that tipping point is when we actually going to realize that tipping point. It is going to be the worst if one year we realize we can't afford anything. I've been kind of thinking of working with the research team on staff just to kind of peel back the onion a little. Just like, Is what we use in USCM the best way to estimate the program? As parametric estimating is our foundation for is, if any problems of program experiences is going to be captured by the raw cost, we then normalize the data and it goes into USCM. We then start to estimate our new programs based on the poor performance of our previous programs as if they are expected to have the same mistakes. And now future programs become more and more expensive. I don’t

think that this is necessarily right. I mean, case in point, one of our protected tactical systems that we're estimating right now. I mean the concept is not that difficult, but for some reason the inputs that we're using and how were applying factors and stuff. I mean these systems are like ten billion dollars, what are you building here? I know there's things in satellites that are made of gold, but the entire thing is not made of gold. I think there's things that we need to really understand quickly because going into the future I don't think the way we do our estimates and set or budgets is sustainable for long term.

Q09: In your experience, can you remember an instance in which a new cost analyst either had the right skillset for the job or did not? *What happened*?

I can say one of our new trainees right now. A GS-07 has a math degree and has really grasped the parametric aspects the best estimating and how we create it. That's just him because you know he sees in numbers and he sees equations and he is flying through his first year training program, just in the work that he's doing and just fully understanding it. On the flip side of that, we haven't had at least many with limitations of coming with a very non-technical degree. And then from like a brand new cost officer perspective, I think it's tough because you are not only are you trying to learn costs and learn the various disciplines, but also trying to learn Air Force as well. The first year is always a tough one because you're out at BFMOC training and doing online training courses. As much as we rely on DAU for our CBT's, I feel like there is probably a better way that it could be done. If someone is sent to AFIT who does not have that acquisition experience and goes through the cost program, when they arrive at their new base, you have the basic skills, but you still need to understand the big picture of where you fit in the Air Force and in the organization. Coming out of AFIT in 2010 and then going into MILSATCOM, I didn't know anything, however everyone expected me to do much because I had that title. Having and

AFIT degree or a technical degree helps, but I think the kind of bigger thing that looms over, is just if you're new to the Air Force or new to an acquisition center you've got to learn that first.

Q10: Thank you for your time today. Are there *any additional thoughts or concerns* you wish to address?

No, I'm excited!

Interview 2

Demographic Information

Age: 36
Rank: Major
Duty Location: Los Angeles AFB
Unit: SMC/MC
Years of Cost Experience: 6
Current Job Title: Deputy Cost Chief
Undergraduate Location/Major: Embry Riddle in Daytona Beach Florida Aviation Business and Administration

Q01. Based on your experience in the cost career field, what *bachelor's courses* would you recommend people take if they are pursuing a career in cost? Why?

Definitely calculus to understand the math side of, absolutely necessary. I think there's some management courses that everybody could benefit from as well, just basic business management, understanding and how the office works and interactions with people. I think systems engineering classes would be great, I don't know if we could require the bachelor's because you don't necessarily know you know if you're getting into costs or not by any kind of engineering type classes I think would be very beneficial to have that background for the cost career field.

Q02: Currently new entrants into the cost career field are required to have a *bachelor's degree* and no other educational requirements. Should the cost career field *require a Science, Technology, Engineering or Math (a.k.a. "STEM") degree* (e.g. Industrial Engineering, Operations Research, Applied Math, etc.)? Why or why not?

I don't think it's necessary for a new entrance to have that. I think it would be beneficial, but if the pool of people with that experience is not large enough, then I think people who just regular

business degrees can be successful in the cost career field without that step background however it certainly helps. Not a requirement but I think it's an identifier of who will be successful, not that other people can't make up the experience. I think would be best to have a statistic or math background but I don't think it's absolutely necessary, so desirable not mandatory.

Q03. What *master degree* programs are most beneficial to the 65W career field? Why?

I think any mathematics masters, also systems engineering would certainly be helpful. Probably the most helpful would be systems engineering. AFIT cost degree was great and I think that was very beneficial and for me personally in my understanding of cost and I was able to step into an office and can have a background right away as opposed to, you know coming off the street not knowing.

Q04. Have there been any *previous certificates and/or additional courses* you have taken that have benefited you in your cost career? If so, which certificates and/or additional courses and why?

The AFIT degree was the most beneficial along with the courses offered at AFIT. I haven’t found much value in any of the online courses I have taken. Some of the BCS course actually were pretty good so that did help with my understanding some were overkill and I took so long ago I don't really remember which the good ones were.

Q05. What types of *business skills* do 65W officers need to be successful in the USAF? Why?

Business skills, its more just the interpersonal relationships and just knowing how to talk to people. Knowing what you can expect from certain individuals. Developing those in a personal relationship. Being able to talk to engineers differently and SETA support and then you talk to military and there's overlap. You just must understand everybody's role and what motivates them. How the best benefits the program by incorporating everybody

Q06. What types of *cost knowledge* do 65W officers need to be successful in the USAF? Why?

We certainly need to understand the math behind our cost estimates and so you need to understand inflation you need to understand learning curves you need to understand the CER's,

how we develop those, regression analysis. You really need that basic understanding so you know, kind of what questions to ask and you understand what the tech team is put together on the cost side so your SETA support. You need to understand the products that they're developing see you can explain that to program managers and the engineers and kind of bridge that gap. Because you know sometimes it gets a little too technical and you need to be able to translate that into a not cost speak language for senior leadership

Relating to the skills, being able to communicate with the appropriate level so that they understand we're talking about?

Definitely! I mean you're not going to be in an O-6 meeting discussing you know regression analysis and all that, but you need to have that background in case they do ask you some specifics on what went into the numbers.

Q07. What *Knowledge, Skills, and Abilities* do we *currently need* in the cost career field, but *lack* and/or do not teach well? Why?

I would say systems engineering, we didn’t cover that much AFIT that I can remember. You know we took some lean management courses which, probably one lean management course is good, but it seems like there is a lot more like process related courses that are necessary. So basic systems engineering can just understand how engineers approach a problem I think would be really beneficial. And you know if we knew that people were going to terminals are going into spaces systems, if we had like a more focused basic systems engineering course design for that job would be excellent. Not sure that you can really apply that at AFIT. There might be a follow on like when you have reports to your next assignment to give you a system engineering background at what they do at that base. And I know on the AEHF program, there was like a three day long orientation and they broke down some of the elements of the system and it was

very helpful. I mean it wasn't too in-depth which is probably good, but I think we get a little bit more in depth because I know my first program I showed up at, I was dealing with like technical data links, I don't know what a wave form was, I didn't really understand frequency hopping any of that, so I had to kind of learned along the way and just ask questions but I think if I had some more formal training, more systems engineering focused training that would help a lot.

Q08: What *Knowledge, Skills, and Abilities* will the 65W career field need in the *foreseeable future* that are not developed today? Why?

I think we have the most part we teach the math well especially if you have been to a formal training class like AFIT. DAU is helpful for just a general acquisition type; you know this is what a standard acquisition program looks like and that a lot of the just coming to experience like on the job training.

Q09: In your experience, can you remember an instance in which a new cost analyst either had the right skillset for the job or did not? *What happened*?

I say coming in, personally when I came into my first program office with the background it really helped. I think that was a good example of coming in and having you know the right skill set. You know sometimes it is tough for second lieutenants to have the right skill set for the cost because they are brand new to the Air Force and brand new to the cost career field. It's dependent on the individual more than the background on how they're going to adapt and how they're and pick it up and learn. And we've seen you know people here have some, you know, slower starts and I think everybody has seen here has been successful. I am not saying that you need a specific background to be success in the cost career field. It certainly does help to have some background.

Q10: Thank you for your time today. Are there *any additional thoughts or concerns* you wish to address?

Don't you believe so. Thank you.

Interview 3

Demographic Information

Age: 43
Rank: GG-13
Duty Location: LA AFB
Unit: MILSATCOM SMC/MC
Years of Cost Experience: 6 years
Current Job Title: Supervisor Financial Management for Cost
Undergraduate Location/Major: University of South Carolina/ Computer Science

Interview Questions

Q01. Based on your experience in the cost career field, what *bachelor's courses* would you recommend people take if they are pursuing a career in cost? Why?

Certain background of education, but cost can be very broad. I have my masters degree from NPS, but it is very different than in the field and it depends on what kind of work you do what kind of depth you want to do. Being in the military environment, I do a lot of work with the SETA contractors and military and the civilian. So every individual is specially, for their positions, every individual has different amount of effort they were put in. So let's say a military fresh out of college, they come in and they know they're going to be here for two years all they want to do is the managing and kind of the routine model working and briefing. Then you don't really need that math degree. But if you are coming in, some civilians, who really care about the quality, if a person is more focused on the research, to create better methodology. Then they need statistics and a really high understanding of math. In reality, we don't really have much resource, like in time wise with people as well to really dive down to the research area, so if that is common, and if the Air Force gets focused on that research area and gets people who are no more routine and are going to focus in on the research work, then it really doesn't matter unless you separate the two. But with those kind of skills, if you don't use it then you're going to lose it.

I see some history major people coming and there is a learning curve, but they are going to learn, people are educated people and learning really depends on the kind of length a person wants to do for a specific job.

Q02: Currently new entrants into the cost career field are required to have a *bachelor's degree* and no other educational requirements. Should the cost career field *require a Science, Technology, Engineering or Math (a.k.a. "STEM") degree* (e.g. Industrial Engineering, Operations Research, Applied Math, etc.)? Why or why not?

Q03. What *master degree* programs are most beneficial to the 65W career field? Why?

Master's degree, I would say a masters in cost estimating, NPS or AFIT have great programs. It doesn't mean that you are going to be a guru in cost estimating when you come out of college, but you will have a good basis understanding of cost estimating. You will understand if your model is not behaving right or when things are kind of off, then you can spot it. So that basic knowledge will be best and your learning curve will be best. We do offer a lot of training, but if someone doesn't use it then they will lose it. We say basic things, like we set up a 95% learning curve and if you don't have that basic understanding then you will not be ok. But if someone does, then they at least will have some understanding of learning curves even if they do not know the model. Ops Research, some engineering, and some statistics.

Q04. Have there been any *previous certificates and/or additional courses* you have taken that have benefited you in your cost career? If so, which certificates and/or additional courses and why?

CEBOK is really a great book , I would strongly recommend that people coming to the cost career study that book. Even when people take the masters program, but the time you end the program, then you can do it manually. But for the beginners, if you have no background at all, then it might be very difficult. I think it has good basis which is really good. Also, the ICEAA certification because it forces you to study. I strongly recommend all my interns to study for it,

or the ICEAA workshops or conferences. They are not focused in space, but it is interesting and it is good to understand what is happening in our cost community. All those are certificates and courses that are useful.

Q05. What types of *business skills* do 65W officers need to be successful in the USAF? Why?

Cost is more or understanding the system and understanding the acquisition approach and understand all those things and comprehend and be able to communicate how your estimate was created. In order to do that, you need that bigger picture perspective to understands PM roles and budges role. But in reality, the military has the rotation experience with the budget and cost. But a lot of civilians don't have the budget experience, but something good to learn would be the budget basics and the PK role because of acquisition approach and setting up the CLINs and the CDRLs, the requirements we ask from the contractor. It seems like it is very cost, but you need to see the entire thing. And understanding of the role and are hopefully different people's perspective because the cost analysts perspective and PMs perspective they're very different you know, so all those things all those skills are different. People did have the opportunity to go to the masters degree program like that, but in the past we were able to take PM DAU classes even though we're not PM. We were able to take it, but now it has been a few years and they limited it, unless you are required to have it, if not, then you cannot take the course. Simple thirty minutes of my classes are available, but the specific track is still not available. The only way is to, in you operational field, you interact and then learn. All those different things will broaden your understanding of that systems approach and knowledge. And make you do a better job at what you do.

Q06. What types of *cost knowledge* do 65W officers need to be successful in the USAF? Why?

The CEBOK and the technical stuff, you need to understand the system you are building and the system you are estimating. So it all starts with the 881C, that break out of the system. You really need to understand how each subsystem is comprise with, just under that, how the subsystems are built, like what antenna is in it. How your system is built, what is required, will make you a better estimator. One area that I wish we had more avenue to train or explore is the technical training. In the government side, we don't have any training at all, even the basics. On a personal basis you ant to study more and you really want to understand, that is the difference between these antennas and why we need it and what heritage we have with it. Those kind of things. I don't have any way of knowing about it than just bugging the engineers, but sometimes you don't even know where to think. But thankful, in the current situation, I have SETA support who really have in depth, technical knowledge from working with previous contactors and bring how they used to analyze the data. From them, I can find good understanding and good resources and good books to reference. But that is kind of luxury, and I heard that AFCAA used to have their own training where they broke out each subsystem and what basic components are made of. Those kind of training, is really value added.

Q07. What *Knowledge, Skills, and Abilities* do we *currently need* in the cost career field, but *lack* and/or do not teach well? Why?

Yeah, I basically just said that in the past few minutes.

Q08: What *Knowledge, Skills, and Abilities* will the 65W career field need in the *foreseeable future* that are not developed today? Why?

I guess. It is kind of unfair for me to say that we don't have it at all because we do have it. Even SMC level, we support everyone who wants to get a degree. On a personel basic, in a work area, if you want to learn and want that knowledge, you have everything out there. DAU is out there along with the CEBOK, and we have SETA support to answer questions. So I don't think there is more that we can bring in. It is motivation, a lot of times, many different type of people, different

interests when they come to work. I am not saying that if they are not in depth, that they are slackers, I am saying, just everyone is different and you cannot make a person to analyze better. I have experience to try and teach them to have a different perspective or help then with the analysis experience, that is kind of impossible unless you have the motivation to learn. And that is why it is important it is important to like what you do, those people tend to be successful because they put in the effort. There are other people who say, give me your model and I will present it. They are very bright people you know, but they are happy. It is kind of hard, especially, when you look at the military side, they don't know if this will be their entire career for their entire lives. A lot of them, younger, they are more in the place of exploring and learning and not really put in the time to learn the CEBOK at least in the first couple years.

Q09: In your experience, can you remember an instance in which a new cost analyst either had the right skillset for the job or did not? *What happened*?

I worked with someone with a history degree, and I would not have known they had a history degree based on the work they produced. But he was really good, and was really interested in the numbers and the statistics and was really motivated in their knowledge, made good estimates. Even SETA, who has been doing the work for the past 20 years is really bad at analysis and missed the point. I have seen both ways, I don't think it is based on background, but if they are analytical or not and if they can analyze stuff.

Q10: Thank you for your time today. Are there *any additional thoughts or concerns* you wish to address?

So I think, that is all.

Interview 4

Demographic Information

Age: 27
Rank: Captain
Duty Location: LA AFB

Unit: MC/PC
Years of Cost Experience: 2.5
Current Job Title: Lead Cost Analyst
Undergraduate Location/Major: University of Alaska/ Major Finance/ Minor in Economics

Interview Questions

Q01. Based on your experience in the cost career field, what *bachelor's courses* would you recommend people take if they are pursuing a career in cost? Why?

I would say decision analysis, maybe systems engineering, statistics for sure. Process

Management I think like there's a business operations class that was very useful.

Why was the class useful?

It was a good introductory to logistics and business operations in general. We must look at whether or not the EV data looks good or if the cost data looks good and whole picture concept and if it's aligned with where the program is planning on going. If the EV data is saying something, but it just doesn't line up with the big picture program planned then it can mean nothing and it will just be numbers

Q02: Currently new entrants into the cost career field are required to have a *bachelor's degree* and no other educational requirements. Should the cost career field *require a Science, Technology, Engineering or Math (a.k.a. "STEM") degree* (e.g. Industrial Engineering, Operations Research, Applied Math, etc.)? Why or why not?

I think that's definitely valuable to have a STEM degree. But of course I don't know the current climate where we're kind of just struggling to get officers in general, I think it's better to be less picky and then you get here and as long as you put in your due diligence and you put in the time that you need to study your job to study what the needs are for that profession, I think you'll be fine. It may give you a heads up, but I don't really think so I don't think over the long run it's negatable.

Q03. What *master degree* programs are most beneficial to the 65W career field? Why?

So, I can only talk for my experience which was the AFIT program. II would say, I have friends that are cost analysts right now that have M.B.A.'s and their folks that have done master's and completely different things that they moved over to the cost career field they still did great. Again, I think it really is just what analytical tool sets you can bring from wherever you studied, you can bring it.

Q04. Have there been any *previous certificates and/or additional courses* you have taken that have benefited you in your cost career? If so, which certificates and/or additional courses and why?

People are going to say like the CFM and then ICEAA, but I don't think that really helps.

Why is that?

With ICEAA, they kind of just test you on things that you already know and you don't really learn anything ICEAA that you would already know on the job. I think it's good for networking and it's good for kind of figuring out what is being talked about right now on the cost society at the time. It is just once a year. Otherwise I'm not really caught up with what they're talking about. I'm sure there are stuff, I just don't know about them

Q05. What types of *business skills* do 65W officers need to be successful in the USAF? Why?

I would say negotiating people skills are huge. The program may have a problem that they're trying to tackle in the short term and long term and you play decision support to them. If you can't get along with them, all your efforts are going to be for nothing because if they don't respect your opinion on things and your support on things and they won’t ever listen. If you just don't get along with them, they wont really listen, if you approach it the wrong way, then they wont listen. So the analysis needs to be solid, which is a given, but then you also need to know how to deliver that to them and have that repore with them, so that they know they can come to you. I think, I

don't know if this is a business skill, but definitely that attention to detail because you know your report could be great, but you could miss all the attention depending on who's reading it and absorbing that stuff. It may all go out the window if they find mistakes with it.

Q06. What types of *cost knowledge* do 65W officers need to be successful in the USAF? Why?

So as leaders I think it's good to just have you know like a broad overview scoping the whole issue of cost. Understanding the cost concepts that their counterparts in the program office are going to already know. What it comes down to the analyst, I think it's more important for them to have, I would say, a higher level at the analyst level. Because you know the leader should not be doing all the analysis on their own that that's what they have their team there for, of course they need to know a good portion of it The analyst needs to have a very in depth understanding of everything that they're analyzing and how it's going to be interpreted.

Q07. What *Knowledge, Skills, and Abilities* do we *currently need* in the cost career field, but *lack* and/or do not teach well? Why?

I can only speak from my own experience and I will do what I've seen. I think some of my most valuable EVM guys have like program office experience, so they know what it looks like to be dealing with contractors. And they have the experience to be able to say, what they're giving us that their really leading us on. I think that's super valuable and again I think that's more experience than something that can be taught because it would be hard to just find people that have Program Manager experience or program office experience. I guess what could be taught is more contracting. More Program Office activities and their responsibilities and more technical knowledge of the program that you're working on. So if you're working on a program, let’s say COM program that is protected, just having a better understanding of every aspect of development, like from beginning to end. If they are doing regression testing or if they're doing

interactions with N.S.A. on certain crypto, then need to that they're in the middle of modifying this and what does it mean if they can't get this white paper is true? Or what does it mean if they're having issues with this test, or what will that do to the schedule because we don't know the importance of the test or the importance of a step, then you have no idea what the impack is going to be and if in fact it gets push back, then what are the things in the second critical path that are going to come up and how important are those. You can have analysis all day long on the three different streams of tasks that are going to be happening and this is only one that's important is what's on an analyst's might tell you, but you have no idea to actually interpret it like that. You may have a different outcome in your head if you actually knew everything that was behind it and have a better understanding of program office process, the importance of tasks, and also having a better idea the technical aspects of it.

Q08: What *Knowledge, Skills, and Abilities* will the 65W career field need in the *foreseeable future* that are not developed today? Why?

Probably more in software development. It is one of the biggest things here, [LAAFB] like we're about to move over to Agile Software Development for PTES and basically nobody knew anything about agile when we started so there was a tiger team that started up and all they did was ask professionals. So definitely software development.

Q09: In your experience, can you remember an instance in which a new cost analyst either had the right skillset for the job or did not? *What happened*?

I don't think I have all the right skill sets right. So when I first got here, I think things could've have been quicker, it just longer. All the analysis went out at the appropriate time. Just things that might have taken someone just a week, it would have taken me a couple weeks. I think that's the big thing, just the processes in the cost shop just get slow down, but at the end we're not the bottleneck. We provide something to the program manager, like that analysis doesn't get that old

that quickly. If the program is moving at a steady pace, if you can get it to them as soon as you can then that's better. We're not slowing down tests or the result of it. When you don't have experience as a cost analyst, it doesn't impact the program as major as it would impact the program officer if their PM didn't have their experience.

Q10: Thank you for your time today. Are there *any additional thoughts or concerns* you wish to address?

No, thank you.

Interview 5

Demographic Information

Age: 31
Rank: Captain
Duty Location: LA AFB
Unit: MILSATCOM
Years of Cost Experience: 5
Current Job Title: IMA to Cost Chief
Undergraduate Location/Major: USAFA/Business Management

Interview Questions

Q01. Based on your experience in the cost career field, what *bachelor's courses* would you recommend people take if they are pursuing a career in cost? Why?

So definitely I would do heavy statistics. Heavy operations research, so I would definitely do those two for sure. On the kind of the technical side, I think a course on how to do research and how to like something specific. How to build a model and do research. How do you structure your model, and how do you find the information you need and how do you take that information to turn it into meaningful cost estimates that can be accurate and communicate it to leadership. Being technical and being very emotionally intelligent in the way you communicate your results to upper leadership.

Q02: Currently new entrants into the cost career field are required to have a *bachelor's degree* and no other educational requirements. Should the cost career field *require a*

Science, Technology, Engineering or Math (a.k.a. "STEM") degree **(e.g. Industrial Engineering, Operations Research, Applied Math, etc.)? Why or why not?**

I didn't have any cost experience, but I was hired on as a cost lead and it was basically because I was a captain, which was really related with my rank so that was interesting with my rank. Cost is in the acquisition career field and is in of itself a vastly complex. I mean you see the diagrams, you've seen these huge flow charts that people who have been in the career field for years still have yet to really fully grasp. So acquisitions experience first thing. Second thing is specific cost analysis experience, so I came in not having either one, so how do you climb that learning curve quickly and how do you take your experience that is not cost specific and try to apply that to your job. I would say number one you need some kind of acquisitions training, or you should try to get on at least DAU, or try to at least get some kind of certification. At least look to see if DAU makes these courses available to people who are not hired in and I would try to make some cases to where you can open up DAU courses to undergrad students. Then they can try and get ahead of the game try to really understand acquisitions career field before they start understanding the cost analysis piece. I would say a bachelor's degree is enough. If you try and get hired into a cost analysis job, I some point you make a conscious decision to say OK I want to switch from like a certain focus to like more of a finance focus. I think I would argue that most undergraduate students have no idea what they are going to do for their career. I think resources should be made available for acquisition knowledge, either DAU or some other resources and market it to universities.

Q03. What *master degree* programs are most beneficial to the 65W career field? Why?

Probably like any finance specific master degree, AFIT obviously. I would say an M.B.A. potentially, but I wouldn't say the M.B.A. from the more technical on the technical side. I would

say the M.B.A. for just how you think and how you structure business problems. I don’t know any other master’s degree programs out there besides maybe AFIT to get a cost degree

Q04. Have there been any *previous certificates and/or additional courses* you have taken that have benefited you in your cost career? If so, which certificates and/or additional courses and why?

You must have a solid understanding of statistics I think to be in cost. I think there are certain PMI and get spun up on earned value and schedule and not really cost related, but more project management. The PMP certification is one that help me understand more about earned value more about a little bit more about how to the projects and programs actually flow. I think that's good to have that understanding in terms of like not operating in a vacuum, to get a bigger picture view what's going on. I think some DAU courses that revolve around cost, I think that in residence one like BCF 107, was good hands on practice, in terms of building a cost model

Q05. What types of *business skills* do 65W officers need to be successful in the USAF? Why?

Cost field is, I would say the, most specialized field in financial management so I would say in addition to kind of your core officer skills, leadership, communication. You need a technical skill set that is going to allow you to be fluid in building cost models and Understanding how earned value manager works, how project manager works, and overall how the acquisition career field works. I think those kind of integration skills are important and then also to be able to translate the technical stuff into like plain English.

Q06. What types of *cost knowledge* do 65W officers need to be successful in the USAF? Why?

My situation, specifically, I didn’t have experience and I came in leading a team of both government employees and also contractors. They did most of the technical work. Now a cost model doesn't need to be like the super complex like statistical model. I mean it's not it's really what you build what makes the most sense, so it can be something as simple as rate times

number of heads. The first part is if you're coming in and you are an officer who is leading a team and you're in costs, which may happen in the sense that you are an officer, chances are you're probably going to have somebody under you, at least some kind of contractor or GS, I think that is that's a different skill set and different kind of knowledge. It is different versus someone who is actually, an individual who’s actually doing the technical work and building the cost models. I think you need more technical knowledge if you're the one who's actually building the models. You need knowledge on ACEIT, knowledge on CCAR, knowledge on the different program documents to build your model. If you are the lead, you are going to need something more managerial. I think the technology is good, but like the technical knowledge you can kind of build on it through OJT and sitting with people. But in a lead role, you need more or a management kind process knowledge.

Q07. What *Knowledge, Skills, and Abilities* do we *currently need* in the cost career field, but *lack* and/or do not teach well? Why?

I can tell you for sure that sending in new brand new second lieutenant into the cost career field is very difficult in my opinion and here is why. The more unknowns you have, the greater risk of failure you have. So for example, I came in with no acquisition experience and no cost experience. A second lieutenant comes in with three areas, three unknowns; no Air Force experience, no acquisitions experience, and no cost experience. If they are a lead, then no leadership experience. So that's four unknowns, I think it's kind of when compared to the operational side, I think it's unfair to put a brand new second lieutenant roll. In addition, because I think the management in the cost career field is lacking compared to the operational side. I think that is the root cause of a lot of the lack of development in the cost career field. It is the deficiency in the management because in the operational side you have an officer, one or two levels above you, maybe three if its your commander, who's rating on you. They have

experienced, they know what being in the military. On the cost side it's 50/50, you may have a civilian, you may have a military supervisor, and that's tough. How do you compare somebody who supervises and has been in that military experience, who has done what you are doing before, to a civilian? They don't know how to write a OPRs, they don't know how to do the core things [civilians] compared to the military side. I think the second part is, on the operational side, there's a much higher percentage of military members on the acquisitions side compared to the cost side which has a lower percentage of military. So I just think that it's important that if you're coming in new, you need somebody to guide you, and show you the ropes. It is a lot to take in and I think that it's unfair to a second lieutenant to come into that environment where you have all of those unknowns as well as perhaps a supervisor that is unhelpful.

Q08: What Knowledge, Skills, and Abilities will the 65W career field need in the foreseeable future that are not developed today? Why?

Bringing a brand new cost analyst into the acquisition career filled without the guidance that is needed is dangerous. I think the main thing is that you have a career field, it's very complicated, and it's by far the most technical of the financial management career fields. People are smart I think, everyone's pretty smart and capable, but I think there needs to be more guidance. There needs to be more hand-holding along the way, at least initially, because there needs to be like a check in points. We need people who gives frequent feedback, I'm talking with a weekly or bi weekly feedback. Somebody who's brand new needs that to build their skills into kind of course correct. Whereas if you do it quarterly, then that is not enough for the person to learn from their mistakes.

Q09: In your experience, can you remember an instance in which a new cost analyst either had the right skillset for the job or did not? What happened?

One instance was, the person who came it and it was not an officer. They came in and tried, but they just didn't have the skills that they needed and I think, aside from cost skills aside, the person really just didn’t understand Excel or PowerPoint. They didn’t have the basic, kind of building blocks, that you need and there was some periods where we were trying to work with the person and you know give him kind of benefit of doubt and it just wasn’t working. There was an officer that came in, he's brand new like second lieutenant, didn't really know anything about cost or the Air Force or things like that, but he ended up doing pretty well. It was unfair to him to come into the organization because he was almost on an island. He leveraged his resources and other officers and more senior CGOs to guide him

Q10: Thank you for your time today. Are there any additional thoughts or concerns you wish to address?

No.

Interview 6

Demographic Information

Age: 38
Rank: GG 13
Duty Location: LA AFB
Unit: Cost Research
Years of Cost Experience: 9 years
Current Job Title: Operations Research Analyst and Active Cost Chief
Undergraduate Location/Major: NYU/ Mathematics

Interview Questions

Q01. Based on your experience in the cost career field, what *bachelor’s courses* would you recommend people take if they are pursuing a career in cost? Why?

Right now I believe that it only requires some calculus, but I have only used calculus one in my career. Better one would be statistics. They say you must have to have four units of calculus,

that means anyone come from any major, I could be a music major and now I am OK to do the job. I think the intent was lost eventually, I think that it was supposed to be, you need to have a major that requires calculus as a prerequisite, so it gives you more engineering degrees.

Q02: Currently new entrants into the cost career field are required to have a *bachelor's degree* and no other educational requirements. Should the cost career field *require a Science, Technology, Engineering or Math (a.k.a. "STEM") degree* (e.g. Industrial Engineering, Operations Research, Applied Math, etc.)? Why or why not?

I think what I said, is we need more analytical people. I thought to get that was to require something that has a lot of those type of classes. If you want computer programmers then you require those classes to understand computer programming.

Q03. What *master degree* programs are most beneficial to the 65W career field? Why?

We have the NPS and I have many friends who have gone there where it has benefited them.

Did your M.B.A. help you in the cost career field?

I learned coding EVA and I learned other programs too so when I do excel I try and I try to build it so I can optimize my time and I have like automated cells so that when I need to change it, it does it automatically. As the general population here, I don't think it even needed my MBA. Depends on how much of the estimate they are actually putting on the government employee or how much the putting on the contractor.

Q04. Have there been any *previous certificates and/or additional courses* you have taken that have benefited you in your cost career? If so, which certificates and/or additional courses and why?

Well I am in cost research and focusing a little bit on Office Automation too, and a couple of us taught ourselves how to code in Sequel and after we proved concept of the demo they [Program Office] sent us to a class to further expand. If you have a certificate from ICEAA. We incentivize

our contractors to get that cert through their contracts by saying if you have this cert then you can add two years to your experience. If you only have two years of experience and pass the exam then we [Government] will credit you with four years of experience. We haven't made that a requirement yet. How can we force people to have hard skills?

Q05. What types of *business skills* do 65W officers need to be successful in the USAF? Why?

For the most part it sounds like communication. I would say the soft skills. For the most part, people get away with not having soft skills.

Q06. What types of *cost knowledge* do 65W officers need to be successful in the USAF? Why?

A lot of our estimates are done with parametric, so being able to collect the data normalize it and then create cost estimating relationships. And then use statistics so we can bound our estimate. Inflation is another big one. Everything we do, we have to do it along with a budget and we need to normalize it. Understanding all that just knowledge before you can start creating an estimate. That's why I really like the ICEAA exam because you couldn't really bring in anything at all, even making you do R^2 by hand. Here's your 30-40 point dataset, so it's getting you to do and then you have the tools now to do it automatically but you then understand how it works.

Q07. What *Knowledge, Skills, and Abilities* do we *currently need* in the cost career field, but *lack* and/or do not teach well? Why?

I would say hard skills. For example, we model in ACEIT, a pretty standard Monte-Carlo simulating tool. We send people to training, but sometimes people go to the same training more than once, we are not given employees enough time to use to software. Just like if you don't use it, you lose it. Just like, I was taught how to do this two years ago and haven't done it since. My plan, for the contractors, eventually I want the contractors to be an aid while the government

employees become model builders while the contractors become the SMEs and either help find the data sets or help normalize the data.

Q08: What *Knowledge, Skills, and Abilities* will the 65W career field need in the *foreseeable future* that are not developed today? Why?

Hard skills again. We want more technical people. I think we just need to bring more stuff in house. I've seen it more than twice actually when a contract laps/ break in contract where the government people don't know how to use any of the models. The cost shops technically shut down for a bit. They don't even know how to move the schedule a week or two if something occurs in the program and were helpless. And it's getting better, but I think without requiring hard skills, you can't force them to have hard skills.

Q09: In your experience, can you remember an instance in which a new cost analyst either had the right skillset for the job or did not? *What happened*?

He is an example, we have a methodology SMC the software developed code, it's an equation that requires us to have SLOC counts, but to model in ACEIT we had to take all this time to build this template to cover that man CSCI's and know all these different things. So what we did was we got the computer to do it itself. I used that as a lead because we got this new intern that had a background and is a getting a masters in applied statistics and was able to just right into the program and had no knowledge in the computer programming, but was able slowly go into the computer program and then he was able to start running. He didn't know the language, but he understood the concepts.

Q10: Thank you for your time today. Are there *any additional thoughts or concerns* you wish to address?

I think that managers don't need to have a technical degree, but need to understand soft skills while the people doing the estimates need to know the hard skills.

<u>Interview 7</u>

Demographic Information

Age: 36
Rank: GG-13
Duty Location: LAAFB
Unit: FMC
Years of Cost Experience: 10
Current Job Title: Operations Research Analyst
Undergraduate Location/Major: University of Southern California/ Applied Math

Interview Questions

Q01. Based on your experience in the cost career field, what *bachelor's courses* would you recommend people take if they are pursuing a career in cost? Why?

I think that they should have an analytical background. Statistics plays a big role in the cost career field and cost estimating. I would say up to and including calculus. Mainly because of the regression used are at a higher-level math and a statistic to understand the regression.

Q02: Currently new entrants into the cost career field are required to have a *bachelor's degree* and no other educational requirements. Should the cost career field *require a Science, Technology, Engineering or Math (a.k.a. "STEM") degree* (e.g. Industrial Engineering, Operations Research, Applied Math, etc.)? Why or why not?

I think a STEM degree should be desired, but not required. I think if the applicants have up to calculus and at least two courses in statistics then they would be fine.

Q03. What *master degree* programs are most beneficial to the 65W career field? Why?

I would still stick with math and statistics along with business degrees. Also, to have leadership qualities and economics. So a perfect mixture of economics with a business degree with a little bit of leadership would be the ideal master's degree program.

Q04. Have there been any *previous certificates and/or additional courses* you have taken that have benefited you in your cost career? If so, which certificates and/or additional courses and why?

The ICEAA offers a cost certification, the first certification is if you have had two years of experience and the second certificate is offered at the four years of experience. I think ICEAA offers 13 modules to study and then offers a 5-hour exam and I do think that the material is very good to know at a cost estimator. Taking the time to study each module and not just the exam helps you as a cost estimator in your career. You won't be able to pass the exam if you do not study the material. And it is very statistic based and it requires you to do hand calculations and you should be able to do them by hand, and it requires you to do that while you study and during the exam.

Q05. What types of *business skills* do 65W officers need to be successful in the USAF? Why?

So they definitely need to have good communication skill and good at presenting information, the ability to explain different points to different crowds and audiences because everyone learns differently. It is very reliant on communication to get your point across.

Q06. What types of *cost knowledge* do 65W officers need to be successful in the USAF? Why?

So cost is something you don't get taught in undergraduate or at a university unless you go to AFIT. You will not find it in any courses. I feel like a lot of the cost knowledge is gained with on the job training and going through certification courses like ICEAA. And from learning from your peers.

Q07. What *Knowledge, Skills, and Abilities* do we *currently need* in the cost career field, but *lack* and/or do not teach well? Why?

I really feel like we need refresher courses on like statistics. I am not saying that there needs to be a requirement. But as cost estimators, I believe that we do need that preparations and fresh on some of the calculations by hand.

Q08: What *Knowledge, Skills, and Abilities* will the 65W career field need in the *foreseeable future* that are not developed today? Why?

Based on what I have dealt with in the past few years, I don't know any off the top of my head. But talking with people who have done cost estimating for over twenty years, things have changed from then to now. It was a little more simplistic in the past years and in the years to come I can see estimates become more complex. As well as being able to communicate these more complex estimates will be what is currently needed in the future and now.

Q09: In your experience, can you remember an instance in which a new cost analyst either had the right skillset for the job or did not? *What happened*?

So I cant pin point anything within the last few weeks and months. I do know that through DAU we are offered a BCF 204 which is Intermediate Cost Analysis which is the title. It is very statistics based and it is a two week very intensive statistics courses. And I have heard from peers and coworkers that it is a very difficult course and I did notice that a bunch of students did struggle in the course and it really emphasizes the need to understand math and statistics. And I strongly push that cost analysts need to know how to do the calculations on hand to really grasp the knowledge.

Q10: Thank you for your time today. Are there *any additional thoughts or concerns* you wish to address?

I am just interested in your thesis results.

<u>Interview 8</u>

<u>Demographic Information</u>

Age: 30
Rank: GS 14
Duty Location: AFCAA
Unit: AFCAA Space Division
Years of Cost Experience: 8 years
Current Job Title: Senior Cost Analyst
Undergraduate Location/Major: USC/ Business NPS Graduate

<u>Interview Questions</u>

Q01. Based on your experience in the cost career field, what *bachelor's courses* would you recommend people take if they are pursuing a career in cost? Why?

So I think that, based upon my experience and this is just speaking from the civilians perspective too, I think that statistics play a big role as far as your undergraduate degree goes. Because I started working for the Air Force after I graduated college and granted I was a business major so I had statistics in my background. But for people who do the day to day costs work I think that to be able to understand the numbers and do the number crunching like you need to have at least a basic understanding of statistics there are some people don't necessarily understand statistics at all. I also think probably important to have a good understanding of physics because of the environment that I currently work in. Against pacifically for space because even though there are some training courses which give you a good background on what we do here at space command and how rockets work and satellites work. I think to understand the physics behind the tech over the work you do here, you have to understand the physics behind it that you don't necessarily get from a training course. I also think leadership and management courses mainly to, I mean it's great to be able to number crunch, but then you also need to know what you're looking at to be able to figure out a solution if there's a problem. It's not just doing the math, but also interpreting it and then being able to communicate that effectively to your leadership. I think those are as far as like your bases for undergrad courses.

Q02: Currently new entrants into the cost career field are required to have a *bachelor's degree* and no other educational requirements. Should the cost career field *require a Science, Technology, Engineering or Math (a.k.a. "STEM") degree* (e.g. Industrial Engineering, Operations Research, Applied Math, etc.)? Why or why not?

I would say, not necessarily, I know that there are some requirements in there for like basic math, calculus and things of that nature and like I said I think statistics is important thing to have. But there are people like history background or history majors but they themselves can do better cost worth than some of the business majors or finance majors. So just because you have degree in something doesn't necessarily mean you might know more or it might distinguish you more. I do think, probably I would say probably having the engineering and a math degree you would be able to do cost better but it doesn't mean that somebody would have a history degree would not know how to do it better because they might have the courses. So I would think that it probably would depend on their background, you know of other course they have done or other jobs that they've done regardless of what they study for their undergrad.

Q03. What *master degree* programs are most beneficial to the 65W career field? Why?

So I specifically did it costs a Masters Degree program, I thought it was super beneficial. It has helped me in my career and help me gain and understand of the cost side of what we do, but it gives you good background like the budgeting side and the acquisition side. So it kind of an all-encompassing masters degree program. But I think again going back to an engineering degree, it's kind of dependent upon like what you're doing. So like engineering background or like a math program. I wouldn't say that there's just one specific degree that everybody should get because depending on what you do for your undergrad you might not necessarily need that for your master's degree so I would say that it depends on where you are in your career.

Q04. Have there been any *previous certificates and/or additional courses* you have taken that have benefited you in your cost career? If so, which certificates and/or additional courses and why?

For specifically for cost, the ICEAA exam. I haven't taken it but I've done the training for and I intend to go to the workshop. Those are a good way to keep up to date only what everyone else in your community is working on to also give you a perspective of like; oh this is something that

I could potentially use for my analysis and so I think definitely ICEAA for the cost community and just CDFM. I have not done yet but, that is I think good because as cost analysts we kind of forgot about the budget side of things and I believe to be able to become a successful cost analyst you should have both the cost and the budget background. Especially like you know you're not just one sided you don't just see the cost and then ignore how things work on the budget side so I think that being able to blend the two you have a better understanding of the acquisition process.

Q05. What types of *business skills* do 65W officers need to be successful in the USAF? Why?

I think good business skills and problem solving skills and leadership skills. It kind of goes back to again like you can be a good number cruncher but you can't really interpret the results or understand what they mean then you are not accomplishing the position. And that's why I say you know you can't just look at a degree and define a person. Because of having those different backgrounds you might be able to view a problem in a different way or solve a situation a different way. So I would say problem solving skills and then communication skills to be able to communicate to leadership. Presenting your results successfully and then also just being able to lead a group of people as well. Because eventually if you want to progress in your career you are going to have to do those anyway.

Q06. What types of *cost knowledge* do 65W officers need to be successful in the USAF? Why?

So basic skills I think if you're going to college it will just be you basic courses of math skills. So another good thing would be to be able to use software tools. We use Excel, I use Excel, I prefer it, just gives you more room for developing cost models being more creative with how you do thing. I used to excel when I was in college, but I think that Excel is very powerful and if you are able to use it. For example, learning how to make pivot tables I never realized that there was big thing for some people I mean I learned how to make pivot tables on my own but you know some

people prefer that you know who they hire can do a data dump and when you collect data and how you build a database you know and like how easily you can manipulate that data and how you easily can you run excursions with that data or do analysis. So building those types of like sensitivities in a model I think Excels a good tool and be able to use Excel is a very powerful thing a very powerful skill to have because not everybody has that tool or understand it. And then the different types of tools I guess the risk tools that we use is. crystal ball at AFCAA. I learned how to use crystal ball on the job and I didn't know how to use Crystal Ball before. But I use @Risk in my master's degree program. I have used COSTAT on the job, those are just things that I picked up as a result of where I ended up working. But to have those go prior to actually going and working at the organization. You could bring a thorough knowledge of, I can use all these different tools. So you know what's better versus the other.

Q07. What *Knowledge, Skills, and Abilities* do we *currently need* in the cost career field, but *lack* and/or do not teach well? Why?

I do think there are things that are lacking in the career. Thing one of the weaknesses is understanding maybe the budget side of things, I know I struggle with that and I still struggle with that certain at times.

It is because budgets are so intertwined with cost?

I think that when we look at things in a specific view in a meeting and you are talking about cost and then you completely disregard that you are at a specific time in the budget cycle and you haven't taken that into account when you're doing your estimate. I think that's something that we don't necessarily do a good job at trying to work together. As far as like knowledge skills and abilities, that's just more like the people.

Q08: What *Knowledge, Skills, and Abilities* will the 65W career field need in the *foreseeable future* that are not developed today? Why?

I think I've struggled with this when I first started working for the Air Force was when you come on board, you know being straight out of college, you might not necessarily know what you are getting yourself into. I was a corporate finance major and it is completely different than what we do here as cost analysts. When I came on board I started with just training courses and so I was kind of shoved into these training courses to learn how to do cost, but I feel like you can't really shove someone into these training courses without really understanding what it is that we're trying to get out of them. Having training along with actual hands on work is very beneficial for a new person that is straight out of college because I was then able to do that when I moved to like a program office and was able to do that hands on work. I think that you can't really teach cost in a sense that you can't just be like here are your training classes and then this is how it's going to be in the real world so try to replicate this and the real life I think that there needs to be a good mix between training and hands on work. And you know like give a new person a model and be like go do this and go messed up and it's totally fine but take a stab at it and then we'll walk through why thats wrong and what you should to paid more attention to. Like when you are putting the data into the model and how you should be learning a model. And then here's another view are you sure that maybe done it this way and that maybe made your job easier. So just that kind of stuff where you're not just doing training courses and then expected to then implement that a year later and to actual cost models and cost work because I don't think the training necessarily lines up with things work in the real world.

Q09: In your experience, can you remember an instance in which a new cost analyst either had the right skillset for the job or did not? *What happened*?

I mean I've experienced both. Someone who has the right skill set perform a great job and this person had an engineering background and engineering obviously comes with a lot of statistics and technical understanding of things so they were able to be successful their career. And then I

have also seen where they didn't necessarily have those skills sets, they did something maybe similar and they work for different organizations, but then still years later they still struggle because they didnt necessarily know how to use Excel and they didn’t necessarily understand what risk was they didn't understand how you develop cost estimate relationships and why you do that and how you interpret the data you see. That just ended up being what it was, that person struggled and they struggle to this day.

Q10: Thank you for your time today. Are there *any additional thoughts or concerns* you wish to address?

I guess I may be one thing I think part of the reason why the cost community struggles a little bit is because we rely heavily on contractors and we do have a lot of contracting support from like the MCRs. So being a civilian. When I first started working a lot of that cost estimating work was done by contractors so I didn't really get that hands on. It wasn't until really when I moved to AFCAA where I did get that hands on experience, where I did actually do the modeling. Part of the reasons why some of the cost programs are not as successful because some of the cost analysts may not actually doing the modeling, but this is from my experience. and the cost for and so I think maybe.

Interview 9

Demographic Information

Age: 42
Rank: GS 14
Duty Location: AFCAA
Unit: HQ/FM/CS Space Division
Years of Cost Experience: 16 years
Current Job Title: Senior Cost Analyst
Undergraduate Location/Major: USAFA American History

Interview Questions

Q01. Based on your experience in the cost career field, what *bachelor's courses* would you recommend people take if they are pursuing a career in cost? Why?

Yes, so I listed some like an operations research course, statistics, calculus and mechanical engineering, electrical engineering; that something very useful when you are doing space stuff. Obviously if they can specialize, for our purposes, if they do something space related. I think having some very good basic engineering courses is a must and certainly some kind of an economics and at the very least a macroeconomics courses. I would say that for required courses would be statistics. I would say you must know economics and have that king of thinking. Preferred calculus, while we don't sit here and do calculus equations technically; certainly we get in the deeper understanding of certain of analogies that's preferred in the engineering courses.

Q02: Currently new entrants into the cost career field are required to have a *bachelor's degree* and no other educational requirements. Should the cost career field *require a Science, Technology, Engineering or Math (a.k.a. "STEM") degree* (e.g. Industrial Engineering, Operations Research, Applied Math, etc.)? Why or why not?

I think they should I think it should, saying a guy that doesn't have a STEM degree, I think that a cost guy should require a stem degree or some other justification of course work that might check some. You know, I think an example would be you graduated from USAFA with a history degree and you also took all this other stuff there. I was still say yes with the caveat that if you can justify it so maybe how many credits in math did you get, how many credits of statistics did you get? But I definitely think it should be a stem focused career field.

Q03. What *master degree* programs are most beneficial to the 65W career field? Why?

I would I would point back to the courses that described to you and those are preferred. I do I think we need more engineers in this field too, I think that that we have a lot of smart math people which is definitely needed and we got people other fields. I feel like it least my

experience here is that there is a shortage of engineering expertise within this career field. Bill. I think having that engineering background at least partially, in some of your team members, I think is very helpful for the core composition of the cost team.

Q04. Have there been any *previous certificates and/or additional courses* you have taken that have benefited you in your cost career? If so, which certificates and/or additional courses and why?

For me personally, I'm going to say no I. I mean I've done some other things, but honestly, I wouldnt say it's helped me in my cost career. My personal experience, but your responses might vary.

Q05. What types of *business skills* do 65W officers need to be successful in the USAF? Why?

I All right so my number one would be critical thinking skills, and I know that's a pretty broad things. But the ability to look at a problem intelligently and think through possible outcomes and ramifications and think about inputs and outputs and be able to make good decisions based on that. One we do lack quite a bit is good communication skills. And I say on one side you need engineers and on the other we need people to communicate. Sometimes a Venn diagram that doesn't exist you know? But no, I think that's really crucial and that's one thing that they should focus on with cost estimators. Can you just do the calculations, but how do you communicate the results in an intelligent manner that speaks to leadership and speaks to good decision making.

Q06. What types of *cost knowledge* do 65W officers need to be successful in the USAF? Why?

Technical and engineering related knowledge and I think that and that varies based on what they are going to be doing. I would think that it's, to give an example of this is helpful if there was a guy who's going to be a new cost guy that's going to be here either the military or civilian, I think that they should have some kind of core space training, for instance or at least to give them a

cursory understanding is of the system. I am talking about how there should be some requirement of a course. Something to get them some kind of in-depth knowledge in what we do and how to evaluate these systems and what are the technical attributes of these systems that are important to the cost. I feel like we have too many people that walk in and they're really good and I can build cost model and I can develop a CER and I can even tell you what how I did it. And do a really good job of that but I can't tell you the stuff behind what it is I'm actually costly and that's a really important piece. I know as a person with a history major and I made myself go and read and understand what it was probably more self-taught, but I think there probably should be some kind of a formalized process.

Q07. What *Knowledge, Skills, and Abilities* do we *currently need* in the cost career field, but *lack* and/or do not teach well? Why?

See the previous questions. We have good cost estimators, but we need them to develop more specialized cost knowledge. We want to build up cost estimators as a jack of all trades. We have more software intensive systems. Certainly some more specialized knowledge in that. I think there's got to be more independence of process cost estimators from Project Management in at least what I've observed here. So I'm trying to think the implications of that, I'm not I'm not sure exactly so when you say you more independents.

Q08: What *Knowledge, Skills, and Abilities* will the 65W career field need in the *foreseeable future* that are not developed today? Why?

I feel like there's too much political pressure that's put on the cost community now, however I don't observe that from AFCAA perspective because we operate differently here because we are not going to be owners of the products but I think it's rampant in the products centers where the thumb is put on the scales, where that goes against good analysis. So maybe a skill of being able to maneuver the political landscape and having at least an awareness and understanding of it. We live in this time of age with the internet and all this data is available to us all this information is

available. But I feel like there is not good skills of guys going to do data collection and being able to understand how to find information and so I feel that that's a skill that is very rare in the cost estimating community. I can be really good at running the CER or even developing a CER, how do I go get data? what are the sources of that information? how can I obtained it?

Q09: In your experience, can you remember an instance in which a new cost analyst either had the right skillset for the job or did not? *What happened*?

People with the wrong skills or limited skills and unfortunately way too many times, I've seen those people get promoted in the system and stay around long enough. They linger around the system and I feel like there is good way to measure their skills from the leadership standpoint. But I don't think it makes better cost estimators or make good FM analysts. The whole FM certification thing, I think is totally ridiculous and I would totally get rid of it.I don't think computer based training does anything for anybody. I would do a cost estimating certification that is tied, more to, experience based, mentoring based, and maybe project based. Lets get rid of the CBT stuff.

Q10: Thank you for your time today. Are there *any additional thoughts or concerns* you wish to address?

No.

Interview 10

Demographic Information

Age: 30
Rank: GS 14
Duty Location: LA AFB
Unit: FMC
Years of Cost Experience: 11
Current Job Title: FM Cost Estimating Cost Chief
Undergraduate Location/Major: CAL state Dominguez Hills/ Finance

Interview Questions

Q01. Based on your experience in the cost career field, what *bachelor's courses* would you recommend people take if they are pursuing a career in cost? Why?

So definitely the statistics because the CERs we build have regression analysis. We have to do calculus. We have a lot of a lot of programs that do the cost estimate, so it comes down to the analysis and understanding the big picture. Understanding project management, time management, and possibly schedule management perspective. I think having a good engineering background helps you because if the engineering terminology.

Q02: Currently new entrants into the cost career field are required to have a *bachelor's degree* and no other educational requirements. Should the cost career field *require a Science, Technology, Engineering or Math (a.k.a. "STEM") degree* (e.g. Industrial Engineering, Operations Research, Applied Math, etc.)? Why or why not?

Just living a master's degree is probably where the cost estimating career should have at a minimum. If you are going to have a government job, getting a doctor and paying it off with a government job is going to be very terrible for you on a government salary when you're looking at it from the financial standpoint. However, I think out SME level employees, or if you get paid at a subject matter expert level then you should have a doctorate.

Q03. What *master degree* programs are most beneficial to the 65W career field? Why?

I have a general MBA degree, I feel like they are asking it from everyone, and I don't think it benefited me, but it did get the door open. I feel like in cost, it is more your experience versus education that happens to be more important. In terms of software estimating, people with math degrees tend to understand it better and then math becomes important. In terms of hardware components of the programs then an engineering degree would be most beneficial especially when you are working with the technical team. You then understand a lot better and quicker. I require a team to sit down with me in order to understand the engineering side. When you are

making your ground rules and assumptions, you need to sit down with your technical team in order to hash out everything.

Q04. Have there been any *previous certificates and/or additional courses* you have taken that have benefited you in your cost career? If so, which certificates and/or additional courses and why?

I mean I don't have enough of the certificates I did take a leadership PME course and I think those are very helpful when you're trying to climb the ladder in management of the cost community because we learn a lot about leadership integrity, how to lead your team from that's perspective. They recommend the CDFM, but provides no value to cost. It is mostly for budget, but I don't know if it provides value to cost. They also have CEBOK,I feel like the courses were very helpful, the way they laid out the courses for cost estimating. There is a course when you just do modeling, I feel like a modeling course should be integrated into cost knowledge basics. I just feel like getting comfortable building the model and understanding the inputs and outputs. I feel like the time you get into the career field, you are expected to know the modelling.

Q05. What types of *business skills* do 65W officers need to be successful in the USAF? Why?

I think the way things work around here it's changed, so when you talk to a lot of cost people at OSD, they are engineers and they're very introverted so they ask a lot of questions but they are doing their own analysis. Here at SMC, you cannot work in a box, you need to be able to communication, you need to learn how to collaborate. You need to have that personality to make those business relationship, networking within your own program to be successful with the information that they share. I don't know if that is a specific skill set, but having that mentality is ideal. We both need information to get the job done.

Q06. What types of *cost knowledge* do 65W officers need to be successful in the USAF? Why?

First, of courses, the field, you should have access to historical data. You need to get familiar with how the CERS were created and you need to understand analogous programs, something that is like your program. You need to be familiar with those analogous programs with earned value and schedule and what to do with the historical data. Or have communications resource availability to be able to know what's comparable or similar to the program you're asking to estimate. You also need to understand the budget side, you need to know what you are building, like procurement. You need to understand procurement laws and the colors of money along with phasing.

Q07. What *Knowledge, Skills, and Abilities* do we *currently need* in the cost career field, but *lack* and/or do not teach well? Why?

So I think the cost analysts know how to come up with a total value and all the tools to come up with the total value. We need to understand the budget and how to phase the total value. Sometimes we only have a certain amount of money and then we phase to that, but you really need to understand what is happening during those years that you are estimating. Can you really break up your estimating and assign dollar values to certain years? And emphasize why you need those dollar values. There is also the problem that there is not a strong connection with the budget team. Sometimes I feel like they are two separate teams, and we come up with these estimates where the budget team is not informed of the estimate when they receive it. Lastly, I think, we need to understand, like the schedule risk assessment. Like when you first start you either use programmatic estimating or analogous estimating, but at a certain point you need to use actuals. At some point you need to use the schedule risk assessment to be able to put factor on the project I feel like we don't have a good way yet or methodology quite, it is not even in DAU yet, to use a schedule risk assessment. But what if your actuals are not complete yet, and you have this grey area, do we still trust the contractor based on what they say. How do we

estimate that? It does come to learning earned value and schedule, but there is still no course yet to teach the use of schedule risk assessment, we currently just use factors.

Q08: What *Knowledge, Skills, and Abilities* will the 65W career field need in the *foreseeable future* that are not developed today? Why?

I think that phasing is something that we really need to think about, I think coming up with the point estimate and using ACEIT to apply risk to it, then we have the total number and having a good understanding of that tool, but I think phasing and having a logical flow and why we have that logical flow. Instead of using a percentage split and instead use the schedule analysis to come up with the estimates. The second one is having an estimating that is post milestone B, how do we conduct that SRA that is not close to the contractor and has that realism is what we need to improve.

Q09: In your experience, can you remember an instance in which a new cost analyst either had the right skillset for the job or did not? *What happened*?

Well nobody ever fails, we don't give anyone the ability to fail because we have resources here to get guided along the way. We have like new AFIT grads here who have knowledge of cost, but don't know how to apply that to a cost model, but we have SMEs who can walk them through an estimate and give them the background need to succeed, even though they might not fully understand the program when they arrive.

Q10: Thank you for your time today. Are there *any additional thoughts or concerns* you wish to address?

No.

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Vita

First Lieutenant Chase M. Houser graduated the Homestead High School in Sunnyvale, California. He entered undergraduate studies at the United States Air Force Academy in Colorado Springs, Colorado where he graduated with a Bachelor of Science degree in Management in May 2014. Upon graduation, he received a regular commission in the USAF and was placed on active duty. He served as a cost analyst for the Military Satellite Communication Directorate at Los Angeles AFB. In August 2016, he entered the Graduate School of Engineering and Management, Air Force Institute of Technology. Upon graduation, he will be assigned to Hanscom AFB.

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14. ABSTRACT
This research effort intends on identifying the knowledge, skills, abilities necessary for cost analysts to be effective decision support members. The purpose of this research is to determine what levels of education, training, and knowledge are needed by cost analysts in the current career field and in the foreseeable future. It also assesses whether cost analysts associate the levels of knowledge, skills, and abilities as requirements in fulfilling cost analyst duties. Form this analysis, a suggested undergraduate education, master's degree program, and certifications were created for current and future cost analysts to strive to achieve. To accomplish this objective, personal interviews were conducted and utilized. The recommendations of this study are intended to assist cost analysts in attaining knowledge, skills, and abilities necessary in contributing and supporting as a decision support member.

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