NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

JOINT APPLIED PROJECT REPORT

AN ANALYSIS OF THE PRODUCTION, QUALITY, AND MANUFACTURING (PQM) CAREER FIELD COMPETENCY MODEL

September 2018

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13. ABSTRACT (maximum 200 words)

This project examines the Production, Quality, and Manufacturing (PQM) career field competency model against three sources of information: the DAU PQM course learning objectives required for PQM certification Levels 1-3; the top five coded acquisition positions coded as PQM Level 3; and the AT&L PQM Position Category Description (PCD) document used to classify acquisition positions as PQM. The PQM competency model studied in this project has yet to be approved by the Functional Integrated Product Tem (FIPT) Chair. First, the analysis of the DAU PQM course learning objectives validated the PQM competency model. Second, the analysis of a sampling of PDs coded as PQM Level 3 also validated the PQM competency model. The third analysis of the AT&L Workforce PQM PCD did not validate the PQM competency model. Even though the PQM competency model was validated using the DAU PQM course content learning objectives, more thorough research is needed to determine if the entire PQM course content required for certification to Level 3 satisfactorily prepares the candidate to practice the desired competencies outlined in the PQM competency model. In addition, further research needs to be conducted to determine if Army positions are coded properly as PQM acquisition positions based on the AT&L PQM PCD; there are some major gaps between the competency model and the PQM PCD. Through this analysis, it is my hope to impart further confidence that the PQM competency model studied is approvable.

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AN ANALYSIS OF THE PRODUCTION, QUALITY, MANUFACTURING (PQM) CAREER FIELD COMPETENCY MODEL

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Submitted in partial fulfillment of the
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ABSTRACT

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LIST OF ACRONYMS AND ABBREVIATIONS

AAFA	Army Acquisition Functional Advisor
ACPOL	Army Civilian Personnel On-Line
AOIB	Army Organic Industrial Base
AOIBSP	Army Organic Industrial Base Strategic Plan
AQWI	Acquisition Workforce Qualification Initiative
AT&L	Acquisition, Technology, and Logistics
AWF	acquisition workforce
CAS	Contract Administrative Services
CHRA	Civilian Human Resources Agency
CPAC	Civilian Personnel Advisory Center
DACM	Director for Acquisition Career Management
DASD(SE)	Deputy Assistant Secretary of Defense for Systems Engineering
DAU	Defense Acquisition University
DAWIA	Defense Acquisition Workforce Improvement Act
DCMA	Defense Contract Management Agency
DCPDS	Defense Civilian Personnel Data System
DFAS	Defense Finance and Accounting Service
DHA	Defense Health Agency
DISA	Defense Information Systems Agency
DoD	Department of Defense
FASCLASS	Fully Automated System for Classification
FCM	functional community managers
FIPT	Functional Integrated Product Team
GAO	Government Accountability Office
HCI	Human Capitol Initiatives
KSA	knowledge, skills and abilities
LCMPS	life cycle management and product support
MIRR	material inspection receiving reports
ODASD	Office of the Deputy Assistant Secretary of Defense
OIB	Organic Industrial Base

OPM	Office of Personnel Management
ORD	Ordnance
OSD	Office of the Secretary of Defense
PCD	Position Category Description
PD	Position Description
PEP	producibility engineering and planning
PQM	Production Quality and Manufacturing
PSA	product support agreements
QA	quality assurance
SES	Senior Executive Service
SME	subject matter expert
USAASC	United States Army Acquisition Support Center
US DOL	United States Department of Labor

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Thank you, Professor Robert Mortlock, for your feedback and your continuing encouragement to complete this Joint Applied Project (JAP). Thank you to Kathleen Leonard for providing me with the competency model under study in this project and for inviting me to the PQM Leadership Workshop held in July 2016 in Huntsville, Alabama. Thank you to my family for allowing me the time and opportunity to work on and complete this JAP.

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I. INTRODUCTION

A new section was added to the Defense Acquisition Workforce Improvement Act, on 7 January 2011, which "requires the Department of Defense to develop and manage a highly skilled professional acquisition workforce" (Defense Acquisition Workforce Improvement Act [DAWIA], 2011). The Production Quality and Manufacturing (PQM) career field encompasses two of eleven required acquisition-related positions defined in 10 USC Chapter 87–Defense Acquisition Workforce. The two required acquisition positions falling under PQM are: 1) Quality Control and Assurance and 2) Manufacturing and Production (Defense Acquisition Workforce, 2016). The PQM professional's duties have been summed up by Robert Arthur, the Director of PQM, on the Defense Acquisition University's (DAU) website:

> Acquisition-related manufacturing and production duties vary greatly in managerial, administrative, and technical content; but they usually involve program management or monitoring of the manufacturing and production efforts of contractors. The quality assurance specialist manages quality assurance activities to establish essential quality standards and controls. This person also develops and executes plans that focus on quality of design and conformance and fitness for use; integrates quality plans into the system engineering process; and develops policies, procedures, test provisions, and quality requirements in specifications, standards, and solicitations. Using design reviews, functional and configuration audits, production readiness reviews, and milestone reviews, the specialist evaluates quality assurance during acquisition. (Defense Acquisition University [DAU], 2017b)

Acquisition professionals' skill and competency gaps undermine the DoD's ability to meet vital missions. "In 2009, the GAO recommended that the Secretary of Defense identify and update, on an ongoing basis, the number and skill sets of the total acquisition workforce—including civilian, military, and contractor personnel—that the department needs to fulfill its mission" (Needham, 2010, p. 15). The DoD decided to take action and create competency models for each acquisition career field, but sadly as of October 2010, had finished only a small portion of the acquisition workforce competency assessments needed to create the competency models (Needham, 2010). In 2013, the GAO reported that "it is imperative that the department cautiously and strategically take into account

department wide critical skills and competencies needed to maintain its mission" (Government Accountability Office [GAO], 2013, p. 19). The GAO further recommended that the DoD make data-driven decisions for future changes to the acquisition workforce by connecting with the Office of the Secretary of Defense (OSD) Functional Community Managers (OFCM). The acquisition workforce can be shaped in the future through the use of the competency models once the critical skills associated with each acquisition position are understood and by performing competency gap assessments (GAO, 2013).

A new competency model for the PQM acquisition workforce was developed in 2010 by the functional leader for the PQM acquisition career field for the DoD, and the chair and members of a Joint PQM Functional Integrated Product Team (Mandelbaum, Patterson, Hurt, & Shae-Keenan, 2012). The competency model was never finished or implemented and was updated again in 2013 by the Subject Matter Expert (SME) working group; however, the FIPT chair did not accept the model according to the Army Acquisition Functional Advisor (AAFA) for PQM, Kathleen Leonard (K. Leonard, personal communication, November 7, 2016). In 2016, the PQM competency model was revised again by the members of the Joint PQM FIPT; the 2016 model was a combination of the Competency Model 2013 refresh and some markup changes from a PQM Leadership Workshop held in July 2016 in Huntsville, AL. The revised Competency Model 2016 was then submitted to the U.S. Army Acquisition Support Center (USAASC) Army Director for Acquisition Career Management (DACM) Office to be used in a competency gap assessment; the results of the USAASC DACM competency gap assessment have not yet been published as of the writing of this paper. The revised Competency Model 2016 will be used in this literary review which was obtained through an email, to the author, from Kathleen Leonard on November 7, 2016. The revised Competency Model 2016 submitted to the USAASC DACM office, will from this point be referred to as the PQM Competency Model.

A. PURPOSE

The purpose of this research is to determine if the DoD PQM Competency Model (K. Leonard, personal communication, November 7, 2016) can be validated by examining

DAU PQM certification training, the PQM Professional's Position Descriptions (PDs), and the PQM Position Category Description (PCD).

First, the PQM Competency Model will be compared against the DAU learning objectives for each DAU course required in the level I, II, & III core certification standards for the PQM career field. In addition to validating the Competency Model, this comparison may reveal inherent problems, or gaps, in the PQM workforce training program through DAU.

Second, the PQM Competency Model will be examined against a sampling of Position Descriptions (PDs) from the top five job series coded as belonging to the PQM acquisition career field. A position description (PD) describes the work, responsibilities, and major duties of a position (Office of Personnel Management, n.d.). A Manager in need of a position is responsible for creating and updating the PD. This comparison may reveal inherent problems in the Competency Model based on what PQM professionals are actually required to do on the job, which is described in their position description.

Third, the PQM Competency Model will be examined against the AT&L Workforce Position Category Description (PCD) which is used to determine if a position description falls into the category of the PQM acquisition career field. This comparison may reveal inherent problems in the Competency Model based on what PQM professionals are expected to do per the PCD for the PQM career field.

The ultimate goal of the project is to validate the PQM Competency Model by examining: 1) the DAU PQM training curriculum, 2) the PQM career field coded position descriptions, and 3) the AT&L Workforce Position Category Description (PCD).

B. SCOPE AND LIMITATIONS

The Competency Model in this project is the revised Competency Model 2016 submitted to the USAASC Army DACM Office, in preparation for a True Choice Solutions Survey, that had 18 units of competence listed (K. Leonard, personal communication, November 7, 2016). The literary review and examination, in this research, are limited to the DAU learning objectives found in the DAU icatalog on the DAU website, current as of

July 2017 (DAU, 2017a). Also, this literary review and examination are limited to the top five (5) job series coded as PQM. The PDs for this review and examination are limited to those found in the Army's Fully Automated System for Classification (FASCLASS) as these are the only position descriptions available to the general public (Army Civilian Personnel On Line [ACPOL], 2017). The AT&L Workforce Position Category Description (PCD) in this literary review and examination is the version dated as approved on 10 May 2016 and last reviewed on 25 April 2017 found in the DAU icatalog on the DAU website (DAU, 2016).

C. SIGNIFICANCE

In 2015, the Office of the Deputy Assistant Secretary of Defense (ODASD) had the following to say about the PQM workforce:

> The Production, Quality, and Manufacturing (PQM) workforce has diverse but highly synergistic skill requirements and hold a variety of positions to include: production, manufacturing, production management, industrial specialist, production officer, or general, industrial, aerospace, or mechanical engineer.
>
> The production and manufacturing workforce:
>
> - monitors and manages the manufacturing and production activities at Contractor or Government Owned facilities;
> - provides realistic approaches to manufacturing and supply chain management;
> - conducts feasibility assessments of manufacturing risk; and
> - provides advice, assistance, and recommendations to support "make" or "buy" decisions.

The quality workforce:

- manages quality assurance (QA) processes to establish essential quality standards and controls;
- evaluates and executes test provisions for QA requirements throughout the systems acquisition cycle;
- integrates QA plans into the systems engineering process; and
- performs process and product-oriented reviews and audits ensuring compliance with customer requirements. (Office of the Deputy Assistant Secretary of Defense [ODASD], 2015)

The Army PQM workforce has shrunk dramatically over the past several years; as of 2 May 2016, there were only 1,377 active DoD Army positions coded as PQM in the Defense Civilian Personnel Data System (DCPDS) and 53.59% of those positons are filled by a person 50 years old or older, who will soon be retiring (Junior, 2016). Figure 1 lists the number and percentage of personnel in each Army Command in PQM coded positions. Figure 2 shows the age ranges of Army personnel in PQM coded positions.

Commands

Command Description	Count	%	Cumulative %
U.S. Army Research, Development and Engineering Command (ARXR)	743	53.96%	53.96%
U.S. Army Joint Munitions Command (JMC) (ARXQ)	235	17.07%	71.02%
US Army Aviation and Missile Command (ARX6)	153	11.11%	82.14%
U.S. Army Contracting Command (ARXD)	81	5.88%	88.02%
U.S. Army Acquisition Support Center (ARAE)	51	3.70%	91.72%
U.S. Army Tank-Automotive & Armament Cmnd (TACOM) (ARX7)	32	2.32%	94.05%
U.S Army Sustainment Command (ASC) (ARXC)	25	1.82%	95.86%
U.S. Army Material Command (ARX1)	14	1.02%	96.88%
Fld Operating Ofcs of Ofc of the Secretary of Army (ARSB)	8	0.58%	97.46%
Headquarters, AMC (ARX2)	6	0.44%	97.89%
US Army Test and Evaluation Command (ARAT)	6	0.44%	98.33%
U.S. Army Communications Electronics Command (ARX8)	5	0.36%	98.69%
U. S. Military Entrance Processing Command (ARAP)	3	0.22%	98.91%
U.S. Army, Pacific (ARP1)	3	0.22%	99.13%
Office of the Secretary of the Army (ARSA)	3	0.22%	99.35%
21st Theater Sustainment Command (TSC) (ARE2)	2	0.15%	99.49%
U.S. Special Operations Command (Army) (ARSP)	2	0.15%	99.64%
Seventh Army Training Command (AREN)	1	0.07%	99.71%
U.S. Army Security Assistance Command (ARXP)	1	0.07%	99.78%
U.S. Army Medical Command (ARMC)	1	0.07%	99.85%
U.S. Army Central (AR3A)	1	0.07%	99.93%
U.S. Army Recruiting Command and U.S. Army Cadet Command (ARTA)	1	0.07%	100.00%
Grand Total	**1377**	**100.00%**	

Figure 1. The Army Commands Total PQM Positions. Source: Junior (2016).

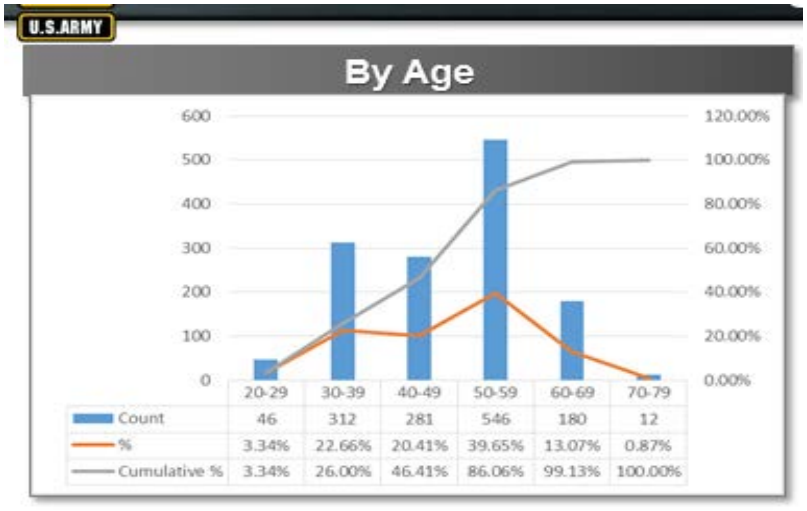

Figure 2. The Army PQM Personnel by Age. Source: Junior (2016).

A competent, skilled, effective, and efficient Army PQM workforce is desperately needed in the future, considering the increasing number of Product Support Arrangements (PSAs) with the Organic Industrial Base (OIB) for supplies and services that support the DoD. A PSA is contractual agreement between the government and a contractor. The agreement describes the deliverables and the performance requirements that must be met by the contractor. These PSAs ensure the DoD gets the support it needs from the OIB to implement, maintain and sustain the DOD's major weapon systems, subsystems, and/or components (Life Cycle Management and Product Support [LCMPS], 2016). PSAs are the main tool used by PQM professionals to ensure performance expectations are met by the OIB and to ensure only quality goods and services are rendered to the government (DAU Acquisition Encyclopedia, 2017).

The OIB is a combination of public and private industries that supply the DoD with goods and services. The Army has its own Army OIB (AOIB) and it includes "resource providers, acquisition and sustainment planners, and manufacturing and maintenance performers" (United States Army Organic Industrial Base Strategic Plan (AOIBSP) 2012–2022, 2012, p. 4). According to the AOIBSP, the AOIB includes Army-owned maintenance Depots, manufacturing Arsenals, and ammunition plants, as well as industrial contractors that play a critical role in the National Security Strategy because they can surge to sustain war efforts. As the Army moves from wartime to peace time, the AOIB must respond accordingly so that the AOIB retains the maintenance and manufacturing skillsets and capabilities needed to meet any future requirements.

A trained, competent, and ready Army PQM workforce is essential when these AOIB counterparts surge for war time efforts. It is absolutely necessary for the Army to understand the skills and competencies needed by the PQM workforce who oversee the OIB's work and accepts products and services for the government. The Army must also forecast the right number of PQM professionals needed on hand during peace time and war time acquisition efforts.

D. BENEFITS OF THE STUDY

This study provides an assessment of the PQM Competency Model to determine if it needs to be further refined or if it can be validated "as-is" in relation to the DAU training, PDs, and PCD document. Also, this analysis may determine if the PDs adequately portray the PQM competencies required by the PQM career field. Finally, this project may determine if the PCD document is adequate "as-is" or if it too may need to be further refined. The goal is to identify and explain the strengths and weaknesses of the PQM Competency Model in relation to the DAU training, position descriptions, and the position category description.

E. THESIS STATEMENT

This study will analyze and determine to what extent the DAU PQM core certification standards validate the competencies required in the latest PQM Competency Model. In addition, the top five (5) PQM coded job series positon descriptions loaded into FASCLASS will be analyzed, to examine the degree to which the Competency Model can be validated through what Managers require of their employees working in the PQM career field, at PQM level III. Finally, the PQM position category description (PCD) will be compared to the PQM competency model to determine the validity of the eighteen (18) competencies listed in the model.

F. RESEARCH QUESTIONS

1. Primary Research Question

   Can the 18 competency unit descriptions described in the latest PQM revised Competency Model 2016 be validated based on the DAU PQM core certification standards and learning objectives?

2. Secondary Research Question

   Can the 18 competency unit descriptions described in the latest PQM revised Competency Model 2016 be validated based on the major duties and knowledge required by the position listed in a random sample of the

top five job series Position Descriptions (PDs) that are coded as PQM acquisition positions which represents 85% of the PQM workforce?

3. Tertiary Research Question

Can the 18 competency unit descriptions described in the latest PQM revised Competency Model 2016 be validated based on the AT&L Workforce Position Category Description (PCD)?

G. PROJECT ORGANIZATION

Chapter I of this research provides an introduction to the PQM workforce and defines the research objectives and questions. Chapter II gives the reader some background information on the PQM workforce, the PQM Competency Model, and the PQM Position Category Description; which are the focus of the analysis in this study. Chapter III presents the data and methodology used in the analysis. Chapter IV discusses the findings of the analysis and finally, Chapter V draws conclusions and provides recommendations for further research.

H. SUMMARY

This introductory chapter described the importance of the thesis, the scope of the research, how the project was researched, and how this report is organized.

II. BACKGROUND

A. THE PQM WORKFORCE

The PQM acquisition workforce is very diverse and is made up of a wide variety of job series titles. According to the Defense Acquisition University:

> Production, Quality, and Manufacturing professionals hold a variety of positions to include: production, manufacturing, production management, industrial specialist, production officer, or general, industrial, aerospace, or mechanical engineer, product assurance engineer, quality assurance specialist, Mathematical Statistician, QA Engineer, Supervisory and/or Quality Engineer, Supervisory and/or General Engineer, Pharmacist, Physical Scientist, Chemist, Electronic Technician, Product Line Specialist (PLS), QA Director/ Chief (Division, Branch or Section); QA Surveillance Representative/Specialist, Engineer Technician, Entomologist, Computer Specialist, Product Auditor; Aircraft, Aerospace, Ammunition, Automotive, Chemicals, Clothing, Electronics, Materiel, Mechanical, Medical, Nuclear, Processes, Shipbuilding, Computer Software, or Subsistence, etc. (DAU, 2016)

Figure 3 lists the Army PQM personnel by occupational series and Figure 4 lists the Army PQM personnel by career program. As of FY17Q2, the total DoD PQM Acquisition Workforce (AWF) was 9,826 civilians and 729 Military personnel strong, or 7% and 5%, respectively, of the overall DoD AWF (Human Capitol Initiatives [HCI], 2017). According to HCI, the Army had 1,389 PQM coded personnel on its rolls as of 31 March 2017. Although DoD PQM career field consists of 68 different occupational codes, 85% of the Army PQM workforce are found in five job series codes. Forty-six percent (46%) of the Army PQM workforce works in Quality Assurance, occupational series code 1910 (Junior, 2016). As of May 2016, the top five job series codes for the Army PQM career field were: 1910-Quality Assurance Specialist, 0801-General Engineering and Architecture, 0301-Miscellaneous Administration and Program Series, 1150-Industrial Specialist, and 0830-Mechanical Engineering (Junior, 2016). Almost 75% of the Army PQM workforce is assigned to two Career Programs; Quality and Reliability Assurance (CP-15) and Engineers and Scientists (non-construction) (CP-16) (Junior, 2016). Less than 11% of the Army PQM workforce do not belong to a career program at all (Junior, 2016).

As of FY17Q2, the annual attrition rate, not including recodes, for the overall DoD AWF was 6.6% (HCI, 2017).

U.S.ARMY

By Occupational Series

Occ Sers	Count	%	Cumulative
1910	642	46.62%	46.62%
0801	333	24.18%	70.81%
0301	95	6.90%	77.71%
1150	64	4.65%	82.35%
0830	38	2.76%	85.11%
1101	35	2.54%	87.65%
0896	30	2.18%	89.83%
0893	18	1.31%	91.14%
0802	14	1.02%	92.16%
0854	12	0.87%	93.03%
0062	11	0.80%	93.83%
1152	10	0.73%	94.55%
0346	9	0.65%	95.21%
1320	8	0.58%	95.79%
0850	8	0.58%	96.37%
0340	7	0.51%	96.88%
0018	7	0.51%	97.39%
1670	6	0.44%	97.82%
0855	6	0.44%	98.26%
1529	4	0.29%	98.55%
1550	3	0.22%	98.77%
0343	3	0.22%	98.98%
0819	2	0.15%	99.13%
0803	2	0.15%	99.27%
0028	2	0.15%	99.42%
0856	2	0.15%	99.56%
2030	1	0.07%	99.64%
1515	1	0.07%	99.71%
0806	1	0.07%	99.78%
1199	1	0.07%	99.85%
1301	1	0.07%	99.93%
1321	1	0.07%	100.00%
Grand Total	1377	100.00%	

Figure 3. Army PQM Personnel by Occupational Series. Source: Junior (2016).

By Career Program

Career Fld	Count	%	Cumulative %
15 - QUALITY AND RELIABILITY ASSURANCE	574	41.68%	41.68%
16 - ENGINEERS AND SCIENTISTS (NON-CONSTRUCTION)	453	32.90%	74.58%
-	144	10.46%	85.04%
33 - AMMUNITION MANAGEMENT	72	5.23%	90.27%
14 - CONTRACTING AND ACQUISITION	30	2.18%	92.45%
13 - SUPPLY MANAGEMENT	28	2.03%	94.48%
17 - MATERIEL MAINTENANCE MANAGEMENT	25	1.82%	96.30%
11 - COMPTROLLER	14	1.02%	97.31%
20 - QUALITY ASSURANCE SPCLST (AMMUNITION SURVEILLANCE)	12	0.87%	98.18%
12 - SAFETY & OCCUPATIONAL HEALTH MANAGEMENT	8	0.58%	98.77%
18 - ENGINEERS AND SCIENTISTS (RESOURCES AND CONSTRUCT)	6	0.44%	99.20%
34 - INFORMATION TECHNOLOGY MANAGEMENT	4	0.29%	99.49%
26 - MANPOWER AND FORCE MANAGEMENT	3	0.22%	99.71%
93 - AIRCRAFT MAINTENANCE	2	0.15%	99.85%
57 - ADMINSTRATIVE AND OFFICE SUPPORT	1	0.07%	99.93%
29 - INSTALLATION MANAGEMENT	1	0.07%	100.00%
Grand Total	1377	100.00%	

Figure 4. Army PQM Personnel by Career Program. Source: Junior (2016).

B. PQM CAREER FIELD COMPETENCY MODEL

The PQM core competency assessment effort began in May 2009 (Torelli, 2009). The purpose for the DoD PQM competency development is due to the fact that Title 10 USC, section 115b, requires the DoD to assess workforce gaps, manage an inventory of competencies, and develop strategic workforce strategies to monitor progress to close competency gaps (DCPAS, 2015). "A competency is an observable, measurable pattern of knowledge, skills, abilities, behaviors, and other characteristics needed to perform work roles or occupational functions successfully and can be technical or nontechnical in nature" (Department of Defense Instruction, 2016, p. 21). Using a competency based strategy for strategic workforce planning is advantageous because it helps to attract, assign, develop, and retain the best civilian workforce (DCPAS, 2015).

The Deputy Assistant Secretary of Defense for Systems Engineering (DASD(SE)) serves as the Functional Lead for the PQM career field as documented in DoDI 5134.16, Deputy Assistant Secretary of Defense for Systems Engineering (ODASD, 2017). The Engineering Enterprise Director serves as the Executive Secretary for the Functional Leader for the PQM career field and is responsible for managing the PQM Functional Integrated Product Team (FIPT) (ODASD, 2017). A new competency model for the PQM acquisition workforce was developed in 2010 by the functional leader for the PQM acquisition career field and members of a Joint PQM Functional Integrated Product Team (Mandelbaum et al., 2012). The competency model was never finished and approved by the FIPT chair. The model was updated again in 2013 by the Subject Matter Expert (SME) working group; however, the FIPT chair still did not accept the model according to the Army Acquisition Functional Advisor (AAFA) for PQM, Kathleen Leonard (K. Leonard, personal communication, November 7, 2016).

The Army Acquisition Functional Advisor (AAFA) for PQM, Kathleen Leonard, graciously provided the competency model baseline, a 2013 verb refresh version, the Acquisition Workforce Qualification Initiative (AQWI) version, and a 2016 revised version of the PQM Competency Model (K. Leonard, personal communication, October 11, 2016, and November 7, 2016). The impetus for this study is the 2016 further refined list of PQM Career Field competencies that was recently submitted to the USAASC Army

Defense Acquisition Career Management (DACM) Office with the 18 competency units shown in Table 1 (K. Leonard, personal communication, November 7, 2016).

Table 1. 2016 Revised Version of the PQM Competency Model Units and Descriptions.

	Competency Unit	Competency Description
1	Defense Acquisition Management Process	Understand, implement and evaluate the production, quality, and management (PQM) activities in the Department of Defense acquisition process to include the DoD 5000-Series and related policies as well as the Defense Acquisition Guide. Also includes the requirements generation process, and the Planning, Programming, Budgeting, and Execution process.
2	Defense Contracting Process	Identify, employ appropriate clauses, and evaluate trends in adequacy of Defense contracting instructions, regulations and policies related to PQM, industrial base, and systems. Relate defense acquisition contracting activities, such as Pre-Award, Source Selection, negotiations, Post-Award, Technical Evaluations of Contractor Cost Proposals, contracting procedures, structure (Parts) of the contract, contract modifications, changes to the contract, Data Item Descriptions, and Contract Data Requirements List. Acquisition, as well as the roles and responsibilities of the contracting, acquisition, PQM workforce.
3	Surveillance Activities	Recognize PQM Contract Administrative Services (CAS) roles, responsibilities and capabilities. Perform and manage PQM CAS activities e.g., monitoring contractor deliveries and progress payments, reviews and audits of contractor facilities and processes (manufacturing and business), and evaluating manufacturing in-process reviews, non-conformance material assessments, compliance reviews, process capability studies as well as the acceptance process and Material Inspection Receiving Reports (MIRR)

	Competency Unit	Competency Description
4	Technology and the Industrial Base	Assess national technology and industrial base capabilities to support the design, development, production, operation, uninterrupted maintenance support of the system and eventual disposal, e.g., environmental impacts. Leverage Department of Defense industrial base programs e.g., the Manufacturing Technology Program, Defense Priorities and Allocations System, Defense Production Act Title III Program, Science and Technology program structure and Technology Readiness Levels.
5	Systems Engineering Process	Perform the systems engineering process, (e.g., traceability of requirements (the Joint Capabilities Integration and Development System process); the maturity and stability of the evolving system design; production, quality, and manufacturing criteria for Systems Engineering Technical Reviews, and the Systems Engineering Plan). Perform the integrated product and process development ("Design-Build") approach to Concurrent Engineering, design trades for manufacturing and production (e.g., multi-year procurement and Economic Ordering Quantities), Producibility Engineering and Planning (PEP), technical risk identification, management and reporting.
6	Risk Management	Perform the risk management process and manage PQM risk and readiness.
7	Cost and Funding	Recognize funding parameters and practices to achieve program manufacturing targets and goals. Apply knowledge of cost modeling and cost analysis (e.g., sensitivity analysis). Identify manufacturing and production cost drivers, understand manufacturing cost risks, and allocation of cost targets to subsystems. Assess affordability.

	Competency Unit	Competency Description
8	Materials Management	Assess the risks associated with materials (including basic/raw materials, components, semi-finished parts, and subassemblies). Includes materials properties and maturity, security, availability (e.g., scale-up, long-lead, and single/sole/foreign sources), subcontractor management and supply chain issues, special handling, storage (hazardous materials), shelf-life, and Government Furnished Property/Material/Equipment/Facilities issues.
9	Process Capability and Control	Appraise the risks in manufacturing processes' ability to reflect the design intent (repeatability and affordability) of key characteristics, (e.g., manufacturing modeling and simulation (product and process), manufacturing process maturity, and process yields and rates.
10	Quality Management	Appraise the risks and management efforts to control quality, and foster continuous improvement (e.g., knowledge of quality management (quality models, quality strategy, quality planning, and quality tools (such as Quality Function Deployment, Design Of Experiments, Statistical Process Control, Key Characteristics, etc.), product quality (product inspection and acceptance testing - in-process and final), cost of quality, scrap, rework and repair rates, and Material Review Board actions, and Supplier Quality Management (including supply base quality improvement).
11	Waste Reduction	Know, apply, interpret results of and critique contractor use of principles to reduce waste in new and existing processes to improve production efficiency and effectiveness
12	Manufacturing Workforce	Assess the number of personnel required, as well as skills, availability, and training/certification requirements needed to support the manufacturing effort.

	Competency Unit	Competency Description
13	Facilities	Assess the capabilities and capacity of public or private (government or contractor) manufacturing facilities, such as, maintenance/repair depots, prime contractor, subcontractor, supplier, and vendor engineering/manufacturing plants, e.g., tooling and test equipment.
14	Planning & Control	Assess and evaluate the organization of all elements needed to translate the design into an integrated and fielded system (meeting program goals for affordability and availability). E.g., manufacturing strategy development, manufacturing planning, scheduling & control, materials planning, and industrial engineering activities.
15	Product & Process Evaluation	Establish and evaluate production and management processes to ensure that producibility, manufacturability, and quality goals will be met. Evaluate products to ensure that customer requirements are met. Conduct and establish process improvement efforts. Determine process non-compliance root cause and corrective actions. Establish and evaluate Statistical Process/Quality controls and other variability reduction efforts
16	Auditing & Reviews	Plan, execute and document audits or technical reviews to determine compliance with requirements, specifications, standards, and evaluation criteria. Evaluate non-compliance root cause and corrective actions for acceptance and implementation. Assess compliance to technical review gate requirements.
17	Supply Chain Management	Identify critical parts and suppliers. Develop grading criteria. Analyze suppliers' performance to grade/rank suppliers. Assess supplier capability. Assess supplier financial viability. Determine Requirements flow-down to suppliers and evaluate compliance.

	Competency Unit	Competency Description
18	Production Support	Support production by controlling inventories, technical data and product configurations. Support production line start-up and shut down. Assess product acceptability and requirement compliance (qualification, inspections, test, and acceptance). Determine non-compliance root cause and Corrective actions. Assess and validate acceptance process and procedures and associated equipment.

Source: Army Acquisition Functional Advisor for PQM, K. Leonard, personal communication (2016).

C. POSITION CATEGORY DESCRIPTION (PCD) FOR PQM

When a hiring manager in the Army decides a new position is needed, he/she submits a new or revised PD to the appropriate Civilian Personnel Advisory Center (CPAC), under the U.S. Army Civilian Human Resources Agency (CHRA). A CPAC position classifier will determine if the PD can be coded as an acquisition position in a particular career field. The CPAC Classifier uses the PCD document to determine if the PD should be coded as an acquisition PQM position by comparing the acquisition related duties/functions in the PD to see if a preponderance of the PCD duties are listed there. If a large portion of the duties described in a PD (50% or more) match the "General Acquisition-Related Duties" listed in the PQM PCD, then the positon is assigned to the PQM career field (DAU, 2016).

Managers may also use the PCD document to help write PQM related position descriptions. Proper attention must be given to all acquisition positions and the PD should include career field certification requirements and individual development (Department of Defense, 2006). The Current AT&L Workforce PCD for PQM is shown in Figure 5 and was approved on 10 May 2016 (DAU, 2016).

AT&L Workforce Position Category Description (PCD)

Career Field:	Production, Quality & Manufacturing		
Career Path:	Not Specified		
Short Title	PQM		
Category Code:	H	**Ref:**	(a) DoDD 5000.52 dtd 12 Jan 2005
Date Approved:	10 May 2016		(b) DoDI 5000.66 dtd 21 Dec 2005
Last Reviewed:	25 Apr 2017		(c) DoD Desk Guide for AT&L Workforce Career Management dtd 10 Jan 2006

Notes:

1. This PCD is intended to assist in determining which AT&L career field/path to assign to an AT&L position per Title 10 sec. 1721. If 50% or more of the duties and responsibilities of the position match the "General Acquisition-Related Duties" described below AND the preponderance of those duties match the "AT&L Career Field/Path Specific Duties" described below, assign the position to this position category.
2. All acquisition positions require management attention with respect to certification requirements and individual development. See reference (c).
3. Critical Acquisition Positions (CAPs) are a subset of acquisition positions and Key Leadership Positions (KLPs), are a subset of CAPs. Both CAPs and KLPs represent positions with responsibility and authority that are critical to the success of a program or effort. These positions require management attention with respect to Acquisition Corps membership, tenure and other specific statutory requirements. See reference (c).

General Acquisition Related Duties: The conceptualization, initiation, design, development, test, contracting, production, deployment, integrated product support (IPS), modification, and disposal of weapons and other systems, supplies, or services (including construction) to satisfy DoD needs, intended for use in, or in support of, military missions.

AT&L Career Field/Path Specific Duties: The specific duties fall into one or both of the following categories within this career field:

Production & Manufacturing:

- Monitors and/or manages the manufacturing and production efforts at industry or Government facilities throughout the system acquisition process.
- Assesses and reports on the availability of resources for production and realistic industry approaches to manufacturing and supply chain management.
- Conducts assessments of producibility and manufacturing feasibility and risk throughout the system acquisition process.
- Provides advice, assistance and recommendations to support "make" or "buy" decisions and alternative production processes.
- Performs production/manufacturing surveillance/oversight of Defense Contractors, their associated production/service sub-contractors, and organic/inorganic Industrial Base activities, which provide supplies and/or services. This includes reviews during both pre-award and post-award activities (e.g., proposal review, post-award conferences).
- Performs Industrial Base capability and capacity studies.

Quality Assurance/Quality Control:

- Manages Quality Assurance (QA) processes to establish essential quality standards and controls.
- Develops, executes and evaluates policies, procedures, plans and test provisions for QA requirements throughout the various phrases of the systems acquisition cycle.
- Ensures QA plans are integrated into the systems engineering process.
- Performs process and product-oriented reviews and audits to ensure compliance with QA requirements
- Provides expert support and guidance on QA-related matters to other program office and in-plant functional acquisition personnel.
- Accepts and fields Materiel for U.S. and foreign customers.
- Performs Data Collection and Analysis related to quality of manufacturing and production along with executive process performance and process capability analysis.
- Prepare sampling plans to assure Product Quality for materiel acceptance.
- Assist in the identification of, root cause analysis, and corrective action for the disposition of non-conforming materiel. This includes activities such as participating in Material Review Boards and/or Corrective Action Boards, and processing Product Quality Deficiency Reports.
- Conducts Continual Improvement activities for cost of poor quality.

Typical Line and Staff Position Titles:

Production & Manufacturing: Supervisory, Production, Manufacturing, Industrial Engineer; Production Management, Industrial Specialist; Production Officer; General, Aerospace, Mechanical Engineer, etc.

Quality Assurance: QA Supervisor, Representative, or Staff Specialist; Mathematical Statistician, QA Engineer, Supervisory

Figure 5. PQM Position Category Description. Source: DAU (2016).

D. COMPETENCY MODELS

According to the Competency Model Clearinghouse website, "a competency model is a collection of competencies that define successful performance in a particular industry or work setting" (Competency Model Clearinghouse, n.d.). Competencies and Competency

Frameworks are a great resource for employers to communicate the skills and knowledge a person needs to perform effectively in a particular position or career field (Competency Model Clearinghouse, n.d.). Typically, a competency model includes a competency name (or unit) and a detailed definition or description of the competency. In the PQM Competency Model, the competencies define the types of behaviors the PQM workforce values and what is required for the PQM acquisition community to meet its objectives. The PQM competencies are used to structure and describe areas of development that are necessary for the PQM professional to survive and grow. The PQM competency framework, or model, communicates to the PQM careerist what tasks they need to be able to perform to be proficient in their production, quality and manufacturing acquisition professional role. Having a competency model available can help people demonstrate their PQM expertise. Also, managers of PQM professionals can use competency models to recruit and select staff more effectively and can also utilize the model to evaluate a person's performance more effectively.

Competency models continue to grow in popularity and The United States Department of Labor offered this advice in 2015:

> Competency models are a good resource for industry leaders, educators, economic developers, and public workforce investment professionals to:
>
> - identify specific employer skill needs,
> - define career paths,
> - define stackable credentials,
> - develop competency based curricula and training models,
> - develop industry based performance indicators and certifications, and
> - Develop resources for career exploration and guidance. (United States Department of Labor [US DOL], 2015).

When competency models are developed and validated correctly, the manager can quickly identify skill/competency gaps in his/her people and can provide customized training or professional development to increase a person's competency level. According to an article found on the MindTools website, "to validate a competency, one question to ask is if the behavior is demonstrated by people who perform the work most effectively" (MindTools Club, n.d.). According to the Competency Model Clearinghouse, the competency model validation process should include 12–15 subject matter experts from

industry, industry associates, labor, education, and workforce development so that a full range of stakeholders can provide a national perspective of the competency requirements (Competency Model Clearinghouse, n.d.). The validation process should be collaborative, iterative and may include polls, webinars, teleconferences, and or in-person meetings. The goal for the competency model revisions is to attain agreement from 80% of the subject matter experts that the competency model accurately reflects the industry competency requirements (US DOL, 2015). The PQM Competency Model has not yet been validated, or agreed upon, and approved by the PQM FIPT Chair; therefore, the PQM career field professional continues to lack official guidance from the DoD on his/her role in the acquisition workforce.

E. SUMMARY

This chapter presented the reader with some background information on the current state of the PQM workforce, the development of the PQM competency model used in the research, and the PQM Position Category Description. Even though the revised PQM Competency Model 2016 has not been approved by the PQM FIPT chair, it will serve as a starting point to see if it can be validated by comparing it to what is required of PQM professionals in their PDs, PQM personnel training, and the PQM PCD. Validation of a competency model can be completed by examining if the competency behavior is demonstrated by the people who perform the work most effectively.

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III. DATA AND METHODOLOGY

A. DAU PQM CURICULUM

The first part of this project examines the DAU Course Learning/Performance Objectives as well as the Enabling Learning Objectives for each class required for each level of PQM certification (icatalog DAU, n.d.). Figures 6, 7, and 8 show the Core Certification Standards required for DAWIA certification for PQM level I, II, and III, respectively.

Core Certification Standards (required for DAWIA certification)	
Acquisition Training	**ACQ 101** Fundamentals of Systems Acquisition Management
Functional Training	● **PQM 101** Production, Quality, and Manufacturing Fundamentals ● **CLE 003** Technical Reviews ● **CLM 017** Risk Management
Education	Formal education not required for certification
Experience	1 year of acquisition experience in manufacturing, production, or quality assurance

Figure 6. Level I PQM Certification Requirements. Source DAU (2017c).

Core Certification Standards (required for DAWIA certification)	
Acquisition Training	● **ACQ 202** Intermediate Systems Acquisition, Part A ● **ACQ 203** Intermediate Systems Acquisition, Part B **(R)**
Functional Training	● **PQM 201A** Intermediate Production, Quality, and Manufacturing, Part A ● **PQM 201B** Intermediate Production, Quality, and Manufacturing, Part B **(R)**
Education	Formal education not required for certification
Experience	2 years of acquisition experience in manufacturing, production, or quality assurance

Figure 7. Level II PQM Certification Requirements. Source DAU (2017c).

Core Certification Standards (required for DAWIA certification)	
Acquisition Training	None required
Functional Training	**PQM 301** Advanced Production, Quality, and Manufacturing **(R)**
Education	Formal education not required for certification
Experience	4 years of acquisition experience in manufacturing, production, or quality assurance

Figure 8. Level III PQM Certification Requirements. Source DAU (2017c).

Each Course Learning/Performance Objective and supporting enabling learning objective will be evaluated to see if it meets the intent of at least one of the 18 competency units and descriptions in the competency model. If the evaluation of the DAU class learning

objective meets the intent of a competency unit/description in the competency model, then the data (DAU course number and learning objective) will be put onto the corresponding competency unit row in the competency model excel spreadsheet. This methodology will show if the sum total of all of the DAU training class learning objectives can be correlated to the 18 competency units. If there is at least one DAU learning objective identified for each competency unit in the competency model then the assumption will be that the competency model can be validated by the DAU training course learning objectives offered to PQM professionals. This analysis will answer the primary research question-(i.e., Can the 18 competency unit descriptions described in the latest PQM revised Competency Model 2016 be validated based on the DAU PQM core certification standards and learning objectives?). Another benefit of this analysis may be to identify any gaps (new competency unit needed) in the competency model based on the DAU learning objective review.

Figure 9 shows a flowchart for how the analysis of the DAU course learning objectives will be conducted. First, a review of the competency unit and description will be performed to completely understand the competency requirement. Next, a spreadsheet with all of the competency units and descriptions will be made so that each competency requirement is numbered and identified. A review of the DAU learning objective in each course required for PQM certification will be completed to understand the intent of the learning objective. If the DAU learning objective meets the intent of a PQM competency unit, then the DAU course number, leaning objective number, and a small description will be placed on the respective competency unit row of the spreadsheet. If the DAU learning objective did not meet the intent of one of the 18 competency units, then it will be highlighted on the course learning objective review sheet and noted as a possible gap in the competency model. If all learning objectives associated with a course were listed on the competency unit/description spreadsheet then it will be noted that there appear to be no gap in the competency model. If all of the 18 competency units/descriptions have at least one DAU learning objective associated with them, then the competency model will be considered validated by the DAU courses required for PQM level I, II, and III certification. If there is one competency unit/description not covered by at least one DAU learning objective, then the model will not be validated.

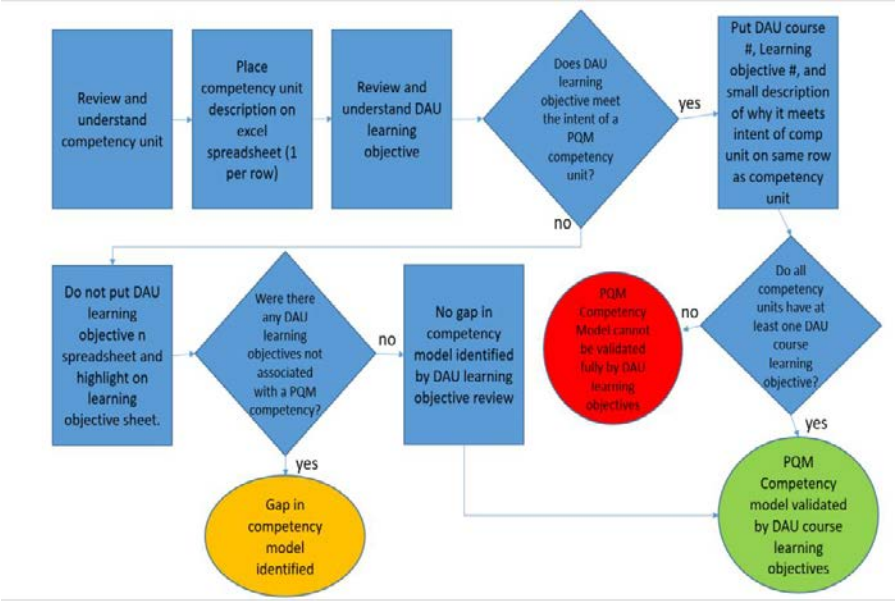

Figure 9. Flowchart of DAU Course Learning Objective Analysis

This analysis is focused on the training of the PQM professional to validate the PQM competency model and does not focus on the long term development of the PQM professional. Training equips a person with knowledge so that the person understands their role, responsibility, and tasks to perform their job function effectively and with some efficiency. Development goes way beyond training to grow a person on a personal level in their career field to handle critical situations, which is not the function of the DAU training courses. The DAU courses are meant to impart explicit knowledge, which can be readily transmitted to others. Wisdom is gained when people recognize patterns and can synthesize and use those patterns to make inferences for interpreting, assessing, validating, linking, and assessing the quality of other patterns (Clark, 2004).

It is important to note that no formal education is required for any level of PQM certification; however, acquisition experience is required in manufacturing, production, and quality assurance. PQM Level I certification requires one year, PQM Level II certification requires two years, and PQM Level III certification requires four years of acquisition experience in manufacturing, production, or quality assurance. Experience varies by each individual seeking PQM certification and is documented in their personal resume; therefore, the experience portion of PQM certification will not be considered in

this analysis in order to validate the PQM Competency Model. Also, because no formal education is required for PQM certification, the assumption will be made that the DAU classes are the only training available beyond experience to gain the PQM competencies. There are many training courses outside of the DAU certification standards that can equip a PQM professional with the knowledge needed per the competency model but because they are not required by the PQM certification standards, and because there are an unlimited number of courses that exist, they were not considered in this review and examination to validate the PQM Competency Model.

B. TOP FIVE PQM CODED JOB SERIES POSITION DESCRIPTIONS IN FASCLASS

The second part of this project focuses on a sample of the Position Descriptions (PDs) in FASCLASS of the top five job series codes in the PQM career field associated with the Army PQM professional population. The top five job series coded as PQM in DCPDS as of May 2016 were: 1910-Quality Assurance Specialist, 0801-General Engineering and Architecture, 0301-Miscellaneous Administration and Program Series, 1150-Industrial Specialist, and 0830-Mechanical Engineering (Junior, 2016).

The PDs were obtained from FASCLASS according to the job series code. Only the top graded positions in each job series (GS-13 and above) were analyzed because these positions are fully developed positions (positions who perform the most PQM specific work); if lower graded positions were evaluated an artificial gap could emerge that is not really there in a fully developed position of the same type. Five (5) PDs in each job series will be randomly selected and evaluated, except for the GS-0830 Mechanical Engineering position because only two positions in the entire FASCLASS list for this positon are coded as PQM level III. A total of twenty (22) PDs coded with a PQM career category, at career level III, were included in the data pull and analysis. When the random sample did not show PQM level III acquisition career field code, it was passed over and another random PD sample was pulled for evaluation.

Figure 10 depicts a flowchart for how the analysis of the Position Descriptions will be conducted. The same spreadsheet with the 18 competency units listed was used for the

position description analysis as the DAU learning course objectives analysis. Each job series was listed as a column in the competency model analysis spreadsheet. If the evaluation of the PD found a match to the competency unit/description, the PD data (PD #, matching description) was logged on the appropriate row in the spreadsheet for the competency unit/description. This methodology assumes that hiring manager's review and update PDs on a regular basis, as guidance suggests in Army Regulation 690–400, Chapter 4302 Total Army Performance Evaluation System (TAPES). This methodology will show if the knowledge, skills, abilities, and duties listed in the PDs can be correlated to the 18 competency units. If there is at least one knowledge, skill, ability, or duty identified for each competency unit in the PQM Competency Model, then the assumption will be that the PQM Competency Model can be validated by the PDs of the top five PQM job series. This analysis will answer the secondary research question. (i.e., Can the 18 competency unit descriptions described in the latest PQM revised Competency Model 2016 be fully validated based on the major duties and knowledge required by the position listed in a random sample of the top five job series Position Descriptions (PDs) that are coded as PQM acquisition Position Descriptions which represents 85% of the PQM workforce?) Also, this review and exam may determine if the PDs adequately portray the PQM competencies required by the PQM career field.

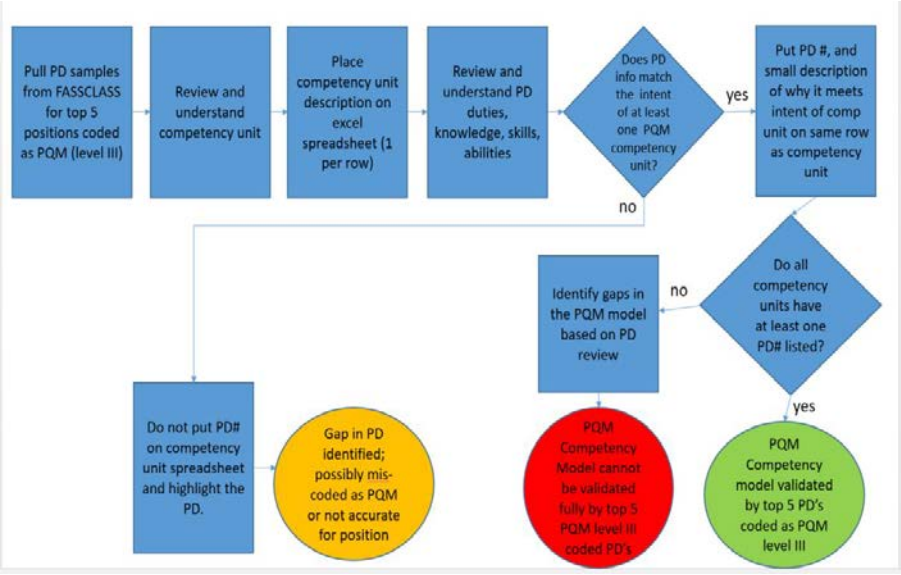

Figure 10. Flowchart of PQM Coded Position Descriptions Analysis

Table 2. List of PDs Randomly Selected from FASCLASS

Position Descriptions Evaluated for PQM Competencies		
Position Description Number	Job Series-Grade	Position Title
BG31120	GS-1910-13	Supervisory Quality Assurance Specialist
BG467189	GS-1910-13	Supervisory Quality Assurance Specialist (Ammunition)
BG347762	GS-1910-15	Supervisory Quality Assurance Specialist
BV384125	GS-1910-13	Quality Assurance Specialist (Automotive)
AA289783	GS-1910-14	Supervisory Quality Assurance Specialist (Aircraft)
BG00N50	GS-0801-13	General Engineer
BSC5257	GS-0801-14	Supervisory General Engineer
BA444494	GS-0801-13	Reliability Engineer
BA469171	GS-0801-13	General Engineer (Software Quality Assurance)
BA102083	GS-0801-14	Quality Assurance Engineer
AU387546	GS-0301-14	Chief of Staff
BT278561	GS-0301-14	SUPV Ammunition Operations Manager
BG20224	GS-0301-15	SUPV Civilian Executive Assistant
BG328450	GS-0301-14	SUPV Industrial Base Specialist
BT388838	GS-0301-14	Chief of Staff
BG350886	GS-1150-13	Industrial Specialist (ORD)
H809466	GS-1150-13	Industrial Specialist (General)
BG484063	GS-1150-13	Industrial Specialist (Ordnance)
H8442145	GS-1150-13	Industrial Specialist (General)
H8406940	GS-1150-13	Industrial Specialist
BA460317	GS-0830-14	Mechanical Engineer
BA431599	GS-0830-14	Lead Mechanical Engineer

C. POSITION CATEGORY DESCRIPTION

The third part of the project will consist of examining the Current AT&L Workforce Position Category Description (PCD) for Production, Quality, & Manufacturing approved on 10 May 2016, which is in Figure 5.

This is the same copy of the PCD that was given out at the Army PQM Leadership Workshop in July of 2016 in Huntsville, AL. The duties listed in the PCD will be evaluated against the eighteen (18) competency units/descriptions in the competency model to see if

all PQM competencies can be validated by the PCD, which is used by a CPAC position classifier to code a position as PQM. See Figure C below for a flowchart on the analysis of the PCD. This methodology will show if the duties listed in the PCD can be correlated to the 18 competency units. If there is at least one duty identified for each competency unit in the competency model then the assumption will be that the PQM Competency Model can be fully validated by the PQM PCD document. This analysis will answer the tertiary research question (i.e., Can the 18 competency unit descriptions described in the latest PQM revised Competency Model 2016 be validated based on the AT&L Workforce Position Category Description (PCD)?) This review and exam may determine if the PCD document is adequate "as-is" or if it too may need to be further refined.

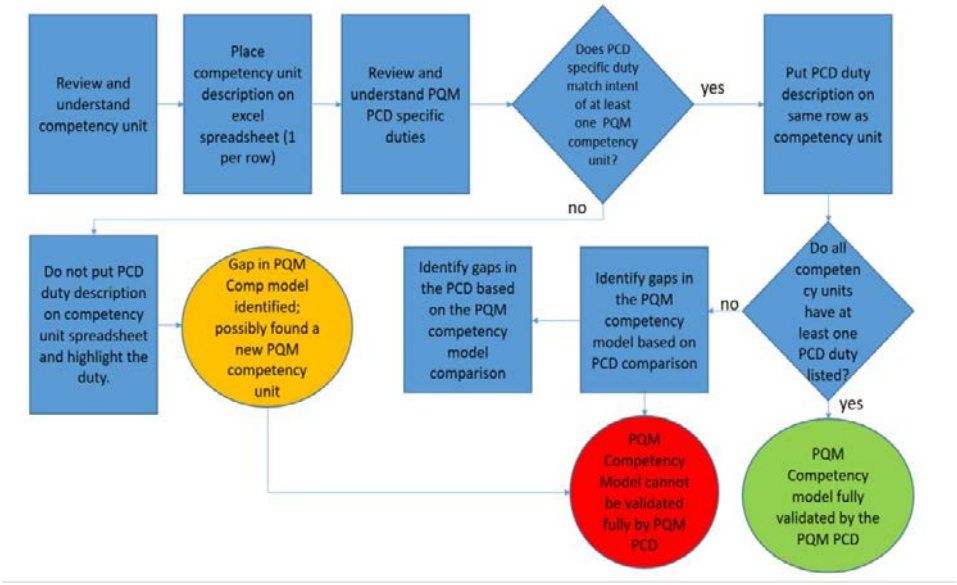

Figure 11. Flowchart of PQM Position Category Description Analysis

D. SUMMARY

This chapter reviewed the various sources of information and data used in this project to validate the PQM Competency Model–specifically, the DAU courses required for PQM certification, the position descriptions of the top five job series coded as PQM level III, and the PQM position category description. Also, this chapter reviewed the

methodology that will be used to answer the research questions. Now that the sources of information and methodology have been identified, Chapter IV focuses on the analysis of the data.

IV. ANALYSIS

A. PRIMARY RESEARCH FINDINGS

The first analysis performed was to determine if the DAU PQM certification training validates the 18 competency descriptions described in the PQM Competency Model. Table 3 shows the DAU course learning objectives that met the intent of the competency unit and competency description. There was at least one DAU PQM learning objective listed for each Competency Unit therefore the PQM Competency Model can be fully validated by the DAU course learning objectives. Most of the competency units are covered by multiple DAU courses and learning objectives. The following competency units had the least number of DAU course learning objectives associated with them: Manufacturing Workforce (only two learning objectives) and Facilities (only one learning objective).

The depth and breadth of knowledge gained when completing a DAU learning objective was not analyzed nor the time spent on each DAU learning objective. Further analysis would be needed to determine if the course content for each learning objective adequately covered all training needed to meet the intent of the competency description. There is no gap in the DAU PQM training regimen since each of the 18 competency units is covered in the training, but again the depth and breadth of the learning objective and course content was not reviewed in this project. On the surface, it appears that the DAU training is light on Manufacturing Workforce and Facilities competencies.

Table 3. DAU PQM Course Learning Objectives that support Competency Unit Training

	COMPETENCY UNIT*	**COMPETENCY DESCRIPTION***	**DAU PQM TRAINING CLASS LEARNING OBJECTIVE****
1	Defense Acquisition Management Process	Understand, implement and evaluate the production, quality, and management (PQM) activities in the Department of Defense acquisition process to include the DoD 5000-Series and related policies as well as the Defense Acquisition Guide. Also includes the requirements generation process, and the Planning, Programming, Budgeting, and Execution process.	ACQ101 learning obj 1 (Defense Acq management system); ACQ 101 learning obj 2 (key players); ACQ 101 learning obj 16 (PQM); ACQ 101 learning obj 3 (requirements generation); ACQ 101 learning obj 7 (PPBE); ACQ 202 learning obj 2 (PPBE); ACQ 202 learning obj 3 (PPBE); ACQ 203 learning obj 4 (acquisition strategy program structure); ACQ 203 learning obj 16 (procedures, rules, public law); PQM 201A (Acq policy concerning PQM); PQM 301 learning obj 1 (applying acquisition policy).
2	Defense Contracting Process	Identify, employ appropriate clauses, and evaluate trends in adequacy of Defense contracting instructions, regulations and policies related to PQM, industrial base, and systems. Relate defense acquisition contracting activities, such as Pre-Award, Source Selection, negotiations, Post-Award, Technical Evaluations of Contractor Cost Proposals, contracting procedures, structure (Parts) of the contract, contract modifications, changes to the contract, Data Item Descriptions,	ACQ 101 learning obj 8 (contracting process significance); ACQ 202 learning obj 5 (role of contracting); ACQ 202 learning obj 6 (termination of contracts); ACQ 203 learning obj 6 (source selection); ACQ 203 learning obj 11 (source selection/best value); ACQ 203 learning obj 15 (contracting/unauthorized commitments); PQM 101 learning obj 6 (source selection, developing RFPs, pre-award survey, contract types, warranties); PQM 101 learning obj 7 (post award conference); PQM 201A learning obj 2 (market research, contract quality requirements in RFP); PQM 301 learning obj 7 (performance based specifications).

	COMPETENCY UNIT*	COMPETENCY DESCRIPTION*	DAU PQM TRAINING CLASS LEARNING OBJECTIVE**
		and Contract Data Requirements List. Acquisition, as well as the roles and responsibilities of the contracting, acquisition, PQM workforce.	
3	Surveillance Activities	Recognize PQM Contract Administrative Services (CAS) roles, responsibilities and capabilities. Perform and manage PQM CAS activities e.g., monitoring contractor deliveries and progress payments, reviews and audits of contractor facilities and processes (manufacturing and business), and evaluating manufacturing in-process reviews, non-conformance material assessments, compliance reviews, process capability studies as well as the acceptance process and Material Inspection Receiving Reports (MIRR)	ACQ 203 Obj 12 (analyze contractor performance indicators); PQM 101 learning Obj 7 (Contract Admin service/process); PQM 101 learning obj 8 (progress payments and physical completion rate); PQM 101 learning obj 8 (production surveillance responsibilities); PQM 201A learning Obj 5 (progress payments); PQM 201B learning obj 6 (technical reviews for progress payments).
4	Technology and the Industrial Base	Assess national technology and industrial base capabilities to support the design, development, production, operation, uninterrupted maintenance support of	ACQ 101 learning obj 4 (technology maturation and risk reduction); ACQ 101 learning obj 11 (science and technology); ACQ 101 learning obj 18 (industry landscape/contracts); ACQ 202 learning obj 1 (applicability of science and technology); PQM 101 learning obj 9 (industrial

	COMPETENCY UNIT*	COMPETENCY DESCRIPTION*	DAU PQM TRAINING CLASS LEARNING OBJECTIVE**
		the system and eventual disposal, e.g., environmental impacts. Leverage Department of Defense industrial base programs e.g., the Manufacturing Technology Program, Defense Priorities and Allocations System, Defense Production Act Title III Program, Science and Technology program structure and Technology Readiness Levels.	capabilities); PQM 301 learning obj 20 (industrial base laws, policies, issues); PQM 301 learning obj 21 (technology readiness reviews).
5	Systems Engineering Process (SEP)	Perform the systems engineering process, (e.g., traceability of requirements (the Joint Capabilities Integration and Development System process); the maturity and stability of the evolving system design; production, quality, and manufacturing criteria for Systems Engineering Technical Reviews, and the Systems Engineering Plan). Perform the integrated product and process development ("Design-Build") approach to Concurrent Engineering, design trades for manufacturing and production (e.g., multi-year procurement and Economic Ordering	ACQ 101 learning obj 10 (SEP); ACQ 202 learning obj 3 (SEP); ACQ 202 learning obj 4 (technical reviews); ACQ 202 learning obj 7 (SEP to transform needs into design); ACQ 203 learning obj 7 (SE); ACQ 203 learning obj 9 (technical risk); PQM 301 (Systems Engineering Process Application); PQM 301 learning obj 8 (producibility); PQM 301 learning obj 23 (Design Of Experiments, SEP).

	COMPETENCY UNIT*	COMPETENCY DESCRIPTION*	DAU PQM TRAINING CLASS LEARNING OBJECTIVE**
		Quantities), Producibility Engineering and Planning (PEP), technical risk identification, management and reporting.	
6	Risk Management	Perform the risk management process and manage PQM risk and readiness.	ACQ 202 learning obj 2 (risk management); ACQ 203 learning obj 3 (program risk); ACQ 203 learning obj 9 (risk based on technical data); ACQ learning obj 3 (risk/affordability); ACQ 203 learning obj 13 (software risks); PQM 101 learning obj 10 (risk management in Acq programs); PQM 201B learning obj 7 (latest issues in manufacturing industry); PQM 301 learning obj 21 risk process models and readiness levels and reviews); CLM 017 Risk Management process and tools.
7	Cost and Funding	Recognize funding parameters and practices to achieve program manufacturing targets and goals. Apply knowledge of cost modeling and cost analysis (e.g., sensitivity analysis). Identify manufacturing and production cost drivers, understand manufacturing cost risks, and allocation of cost targets to subsystems. Assess affordability.	ACQ 101 learning obj 9 (Earned Value Management); ACQ 202 learning obj 1 (Cost); ACQ 202 learning obj 3 (Affordability); ACQ 202 learning obj 4 (Cost Analysis); ACQ 203 learning obj 10 (Cost and Schedule); ACQ learning obj 3 (Affordability); ACQ 203 learning obj 4 (Funding); ACQ 203 learning obj 5 (Funding cuts); ACQ 203 learning obj 12 (EVM; cost/schedule performance indicators); ACQ203 learning obj 17 (impact of manufacturing on cost, schedule, & performance); PQM 101 learning obj 8 (price analysis, cost analysis, cost

	COMPETENCY UNIT*	COMPETENCY DESCRIPTION*	DAU PQM TRAINING CLASS LEARNING OBJECTIVE**
			realism); PQM 201A learning Obj 5 (cost estimating); PQM 201B learning obj 6 (cost estimating/ progress payments); PQM 301 learning obj 18 (activity based costing).
8	Materials Management	Assess the risks associated with materials (including basic/raw materials, components, semi-finished parts, and subassemblies). Includes materials properties and maturity, security, availability (e.g., scale-up, long-lead, and single/sole/foreign sources), subcontractor management and supply chain issues, special handling, storage (hazardous materials), shelf-life, and Government Furnished Property/Material/Equipment/Facilities issues.	PQM 201A learning obj 6 (Material Management); PQM 201B learning Obj 5 (Material Resource Planning); PQM 301 learning obj 3 (5 M's); PQM 301 learning obj 14 (Enterprise Resource Planning or ERP).
9	Process Capability and Control	Appraise the risks in manufacturing processes' ability to reflect the design intent (repeatability and affordability) of key characteristics, (e.g., manufacturing modeling and simulation (product and process), manufacturing process maturity, and process yields and rates.	ACQ 202 learning obj 4 (Modeling & Simulation); PQM 101 learning obj 3 (Process Capability & Process Performance); PQM 101 learning obj 4 (Modeling & Simulation); PQM 201B learning obj 3 (Process Capability and Process Performance Analysis); PQM 301 learning obj 3 (yield, manufacturing as a design constraint); PQM 301 learning obj 4 (Modeling and Simulation); PQM 301 learning obj 22 (Six

	COMPETENCY UNIT*	COMPETENCY DESCRIPTION*	DAU PQM TRAINING CLASS LEARNING OBJECTIVE**
			Sigma and Process Capability analysis).
10	Quality Management	Appraise the risks and management efforts to control quality, and foster continuous improvement (e.g., knowledge of quality management (quality models, quality strategy, quality planning, and quality tools (such as Quality Function Deployment, Design Of Experiments, Statistical Process Control, Key Characteristics, etc.), product quality (product inspection and acceptance testing - in-process and final), cost of quality, scrap, rework and repair rates, and Material Review Board actions, and Supplier Quality Management (including supply base quality improvement).	ACQ 101 learning obj 12 (Test & Evaluation fundamentals); ACQ 202 learning obj 4 (qualitative and quantitative tools; production qualification tests; production acceptance test and evaluation); PQM 101 learning obj 2 (key characteristics); PQM 201B learning Obj 3 (DOE; seven quality tools); PQM 201B learning obj 4 (quality system tools, quality assurance; key characteristics); PQM 301 learning obj 9 (quality function deployment); PQM 301 learning obj 9 (quality function deployment, key characteristics); PQM 301 learning obj 11 (Advanced quality systems); PQM 301 learning obj 12 (software quality management); PQM 301 learning obj 23 (DOE).
11	Waste Reduction	Know, apply, interpret results of and critique contractor use of principles to reduce waste in new and existing processes to improve production efficiency and effectiveness	PQM 201A learning obj 4 (Lean enterprise practices); PQM 201B learning obj 2 (Lean enterprise practices); PQM 301 learning obj 5 (Lean practices); PQM 301 learning obj 6 (value stream mapping); PQM 301 learning obj 10 (application of Lean concepts).
12	Manufacturing Workforce	Assess the number of personnel required, as well as skills, availability, and training/certification	ACQ 203 learning obj 10 (tasks/resources required); ACQ 203 learning Obj 17 (5 M's).

	COMPETENCY UNIT*	COMPETENCY DESCRIPTION*	DAU PQM TRAINING CLASS LEARNING OBJECTIVE**
		requirements needed to support the manufacturing effort.	
13	Facilities	Assess the capabilities and capacity of public or private (government or contractor) manufacturing facilities, such as, maintenance/repair depots, prime contractor, subcontractor, supplier, and vendor engineering/manufacturing plants, e.g., tooling and test equipment.	ACQ 101 learning obj 17 (facilities engineering process).
14	Planning & Control	Assess and evaluate the organization of all elements needed to translate the design into an integrated and fielded system (meeting program goals for affordability and availability). E.g., manufacturing strategy development, manufacturing planning, scheduling & control, materials planning, and industrial engineering activities.	ACQ 101 learning obj 16 (producibility/design); ACQ 202 learning obj 3 (manufacturing planning); ACQ 203 learning obj 3 (affordability); ACQ 203 learning obj 4 (planning); ACQ 203 learning obj 11 (best value); PQM 101 learning obj 1 (manufacturing process planning); PQM 101 learning obj 2 (control systems); PQM 201A learning obj 3 (good manufacturing plan); PQM 201B Learning Obj 1 (manufacturing plans); PQM 201B Learning Obj 5 (concepts of control systems).
15	Product & Process Evaluation	Establish and evaluate production and management processes to ensure that producibility, manufacturability, and quality goals will be met. Evaluate products to ensure that customer	ACQ203 learning obj 8 (role of test and evaluation); ACQ 203 learning obj 17 (root cause); PQM 101 learning obj 1 (quality assurance planning); PQM 101 learning obj 3 (statistical methods).

	COMPETENCY UNIT*	COMPETENCY DESCRIPTION*	DAU PQM TRAINING CLASS LEARNING OBJECTIVE**
		requirements are met. Conduct and establish process improvement efforts. Determine process non-compliance root cause and corrective actions. Establish and evaluate Statistical Process/Quality controls and other variability reduction efforts	
16	Auditing & Reviews	Plan, execute and document audits or technical reviews to determine compliance with requirements, specifications, standards, and evaluation criteria. Evaluate non-compliance root cause and corrective actions for acceptance and implementation. Assess compliance to technical review gate requirements.	PQM 201A learning obj 7 (audit principles, nonconforming product); PQM 201B learning obj 4 (audit techniques); CLE 003 Technical reviews.
17	Supply Chain Management (SCM)	Identify critical parts and suppliers. Develop grading criteria. Analyze supplier's performance to grade/rank suppliers. Assess supplier capability. Assess supplier financial viability. Determine Requirements flow-down to suppliers and evaluate compliance.	ACQ 101 learning obj 13 (logistics & system readiness); ACQ 101 learning obj 14 (performance based logistics); ACQ 202 learning obj 6 (life cycle logistics support activities); PQM 301 learning obj 13 (supply chain design, issues, forecasting); PQM 301 learning obj 15 (impact of information technology on SCM); PQM 301 learning obj 16 (SCM).

	COMPETENCY UNIT*	COMPETENCY DESCRIPTION*	DAU PQM TRAINING CLASS LEARNING OBJECTIVE**
18	Production Support	Support production by controlling inventories, technical data and product configurations. Support production line start-up and shut down. Assess product acceptability and requirement compliance (qualification, inspections, test, and acceptance). Determine non-compliance root cause and Corrective actions. Assess and validate acceptance process and procedures and associated equipment.	ACQ202 learning objective 4 (configuration management); PQM 201B learning objective 6 (physical inventory counts); PQM 301 learning obj 3 (inventory levels); CLE 003 Technical reviews.

*Note: The information in columns titled "competency unit" and "competency description" are borrowed directly from Army Acquisition Functional Advisor for PQM, K. Leonard (personal communication, 2016).

**Note: The information in column titled "DAU PQM Training Class Learning Objective" is borrowed directly from DAU (2017a).

B. SECONDARY RESEARCH FINDINGS

An analysis was performed to determine if the PQM Competency Model could be validated based on the knowledge, skills, and abilities (KSA's) listed in a random sample of the top five (5) job series Position Descriptions (PDs) that are coded as PQM acquisition Position Descriptions. These top five job series represent 85% of the PQM workforce. In order to validate the competency unit, I examined each PD for at least one (1) related element of (knowledge, skill, or ability) in the major job duties and knowledge sections. The sample of PDs from any single job series alone could not validate the entire list of 18 competency units within the PQM Competency Model. The one job series that came the closest to validating the PQM Competency Model was the GS-1150, Industrial Specialist. The PQM Competency Model was validated when considering the collective group of 22 PQM coded position descriptions, from the top five job series. There was at

least one related job element found for each competency unit from the group of 22 PDs. The least mentioned competency units were waste reduction and supply chain management.

Tables 4 through 8 display the individual job series results of the PD examinations against the PQM Competency Model. Keep in mind that this review and examination only considered the top level position descriptions (GS-13 and up) coded as PQM level III, as these are the positions/people who should be most experienced in the PQM field. A review of entry or mid-level PQM coded positions in the PQM workforce may have resulted in an artificial gap in the PQM Competency Model; therefore this was avoided by only examining Level III PQM positions.

Table 4 displays the results of the evaluation of the five PDs associated with the GS-1910, Quality Assurance, job series code. The results of the examination do not validate the 18 competency units listed in the PQM Competency Model. Only thirteen (13) of the eighteen (18) competency units could be validated with this sample of PDs from the GS-1910 job series. Some significant gaps were identified between the PDs evaluated and the PQM Competency Model; there was no mention of Technology and the Industrial Base, Risk Management, Facilities, Planning and Control, nor Supply Chain Management competency units in the GS-1910 PDs.

Table 4. GS-1910 PD elements that support PQM Competency Unit/Description

	Competency Unit*	Competency Description*	1910-Quality Assurance Specialist**
1	Defense Acquisition Management Process	Understand, implement and evaluate the production, quality, and management (PQM) activities in the Department of Defense acquisition process to include the DoD 5000-Series and related policies as well as the Defense Acquisition Guide. Also includes the requirements generation process, and the Planning, Programming, Budgeting, and Execution process.	BG31120, knowledge of acquisition; BG347762knowledgeable on all acquisition program processes.
2	Defense Contracting Process	Identify, employ appropriate clauses, and evaluate trends in adequacy of Defense contracting instructions, regulations and policies related to PQM, industrial base, and systems. Relate defense acquisition contracting activities, such as Pre-Award, Source Selection, negotiations, Post-Award, Technical Evaluations of Contractor Cost Proposals, contracting procedures, structure (Parts) of the contract, contract modifications, changes to the contract, Data Item Descriptions, and Contract Data Requirements List. Acquisition, as well as the roles and responsibilities of the contracting, acquisition, PQM workforce.	BG31120, implements contract data item descriptions; BG31120, knowledge of contract administration; BG31120, thorough knowledge of agency regulations, policies, guidelines related to quality assurance; BV384125, develops contractual scopes of work, contract clauses, data items for development and production contracts; BG347762, knowledgeable on all contract management processes.

	Competency Unit*	Competency Description*	1910-Quality Assurance Specialist**
3	Surveillance Activities	Recognize PQM Contract Administrative Services (CAS) roles, responsibilities and capabilities. Perform and manage PQM CAS activities e.g., monitoring contractor deliveries and progress payments, reviews and audits of contractor facilities and processes (manufacturing and business), and evaluating manufacturing in-process reviews, non-conformance material assessments, compliance reviews, process capability studies as well as the acceptance process and Material Inspection Receiving Reports (MIRR)	BG347762, assess and evaluates contractor activities and systems.
4	Technology and the Industrial Base	Assess national technology and industrial base capabilities to support the design, development, production, operation, uninterrupted maintenance support of the system and eventual disposal, e.g., environmental impacts. Leverage Department of Defense industrial base programs e.g., the Manufacturing Technology Program, Defense Priorities and Allocations System, Defense Production Act Title III Program, Science and Technology program structure and Technology Readiness Levels.	

	Competency Unit*	Competency Description*	1910-Quality Assurance Specialist**
5	Systems Engineering Process	Perform the systems engineering process, (e.g., traceability of requirements (the Joint Capabilities Integration and Development System process); the maturity and stability of the evolving system design; production, quality, and manufacturing criteria for Systems Engineering Technical Reviews, and the Systems Engineering Plan). Perform the integrated product and process development ("Design-Build") approach to Concurrent Engineering, design trades for manufacturing and production (e.g., multi-year procurement and Economic Ordering Quantities), Producibility Engineering and Planning (PEP), technical risk identification, management and reporting.	BG31120, knowledge of design; BG31120, knowledge of engineering; BG31120, integration of system safety engineering.
6	Risk Management	Perform the risk management process and manage PQM risk and readiness.	
7	Cost and Funding	Recognize funding parameters and practices to achieve program manufacturing targets and goals. Apply knowledge of cost modeling and cost analysis (e.g., sensitivity analysis). Identify manufacturing and production cost drivers, understand manufacturing cost risks, and allocation of cost targets to subsystems. Assess affordability.	BG31120, reviews and assesses a variety of product for cost effectiveness.
8	Materials Management	Assess the risks associated with materials (including basic/raw materials, components, semi-finished parts, and subassemblies). Includes materials properties and maturity, security, availability (e.g., scale-up, long-lead, and single/sole/foreign sources), subcontractor management and supply chain issues, special handling, storage (hazardous materials), shelf-life, and Government Furnished	BV384125, studies and evaluates material.

	Competency Unit*	Competency Description*	1910-Quality Assurance Specialist**
		Property/Material/Equipment/Facilities issues.	
9	Process Capability and Control	Appraise the risks in manufacturing processes' ability to reflect the design intent (repeatability and affordability) of key characteristics, (e.g., manufacturing modeling and simulation (product and process), manufacturing process maturity, and process yields and rates.	AA289783, process control.
10	Quality Management	Appraise the risks and management efforts to control quality, and foster continuous improvement (e.g., knowledge of quality management (quality models, quality strategy, quality planning, and quality tools (such as Quality Function Deployment, Design Of Experiments, Statistical Process Control, Key Characteristics, etc.), product quality (product inspection and acceptance testing - in-process and final), cost of quality, scrap, rework and repair rates, and Material Review Board actions, and Supplier Quality Management (including supply base quality improvement).	BV384125, Quality Management; BG467189, plans, directs, administers Quality Assurance programs.
11	Waste Reduction	Know, apply, interpret results of and critique contractor use of principles to reduce waste in new and existing processes to improve production efficiency and effectiveness	AA289783, prevention of defects.

	Competency Unit*	Competency Description*	1910-Quality Assurance Specialist**
12	Manufacturing Workforce	Assess the number of personnel required, as well as skills, availability, and training/certification requirements needed to support the manufacturing effort.	AA289783, assigning, reviewing, evaluating work (full scope of personnel administration requirements and productivity improvement efforts); BG467189, Identifies required resources to accomplish objectives and identifies training and development needs for subordinates.
13	Facilities	Assess the capabilities and capacity of public or private (government or contractor) manufacturing facilities, such as, maintenance/repair depots, prime contractor, subcontractor, supplier, and vendor engineering/manufacturing plants, e.g., tooling and test equipment.	
14	Planning & Control	Assess and evaluate the organization of all elements needed to translate the design into an integrated and fielded system (meeting program goals for affordability and availability). E.g., manufacturing strategy development, manufacturing planning, scheduling & control, materials planning, and industrial engineering activities.	
15	Product & Process Evaluation	Establish and evaluate production and management processes to ensure that producibility, manufacturability, and quality goals will be met. Evaluate products to ensure that customer requirements are met. Conduct and establish process improvement efforts. Determine process non-compliance root cause and corrective actions. Establish and evaluate Statistical	BV384125, knowledge of statistical methods and analysis; BG467189, makes decisions in matters relating to customer requirements based on standards and specifications.

	Competency Unit*	Competency Description*	1910-Quality Assurance Specialist**
		Process/Quality controls and other variability reduction efforts	
16	Auditing & Reviews	Plan, execute and document audits or technical reviews to determine compliance with requirements, specifications, standards, and evaluation criteria. Evaluate non-compliance root cause and corrective actions for acceptance and implementation. Assess compliance to technical review gate requirements.	BV384125, conducts audits; BG467189, plans, directs and administers audit program.
17	Supply Chain Management	Identify critical parts and suppliers. Develop grading criteria. Analyze supplier's performance to grade/rank suppliers. Assess supplier capability. Assess supplier financial viability. Determine Requirements flow-down to suppliers and evaluate compliance.	
18	Production Support	Support production by controlling inventories, technical data and product configurations. Support production line start-up and shut down. Assess product acceptability and requirement compliance (qualification, inspections, test, and acceptance). Determine non-compliance root cause and Corrective actions. Assess and validate acceptance process and procedures and associated equipment.	BG31120, configuration management; AA289783, analysis through audits, inspections, acceptance; BV384125, member of configuration control board; BG 467189, conducts verification inspections and tests of products and processes for conformance to standards and specifications.

*Note: The information in columns titled "competency unit" and "competency description" are borrowed directly from Army Acquisition Functional Advisor for PQM, K. Leonard (personal communication, 2016).

**Note: The information in column titled "1910-Quality Assurance Specialist" is borrowed directly from ACPOL (2017).

Table 5 shows the results of the evaluation of the five PDs associated with the GS-0801, General Engineering and Architecture, job series code. This evaluation did not validate the 18 competency units listed in the PQM Competency Model. Only thirteen (13) of the eighteen (18) competency units could be validated with this sample of PDs from the GS-0801 job series. Some significant gaps were identified between the PDs evaluated and the PQM Competency Model; there was no mention of the Supply Chain Management, Planning and Control, Waste Reduction, Materials Management, nor the Defense Acquisition Management Process competency units in the PDs.

Table 5. GS-0801 PD elements that support PQM Competency Unit/Description

	Competency Unit*	**Competency Description***	**0801-General Engineering and Architecture****
1	Defense Acquisition Management Process	Understand, implement and evaluate the production, quality, and management (PQM) activities in the Department of Defense acquisition process to include the DoD 5000-Series and related policies as well as the Defense Acquisition Guide. Also includes the requirements generation process, and the Planning, Programming, Budgeting, and Execution process.	

	Competency Unit*	Competency Description*	0801-General Engineering and Architecture**
2	Defense Contracting Process	Identify, employ appropriate clauses, and evaluate trends in adequacy of Defense contracting instructions, regulations and policies related to PQM, industrial base, and systems. Relate defense acquisition contracting activities, such as Pre-Award, Source Selection, negotiations, Post-Award, Technical Evaluations of Contractor Cost Proposals, contracting procedures, structure (Parts) of the contract, contract modifications, changes to the contract, Data Item Descriptions, and Contract Data Requirements List. Acquisition, as well as the roles and responsibilities of the contracting, acquisition, PQM workforce.	BA444494, expertise in emerging technologies and develop programs in advancing state-of-the-art RAM engineering; BA469171, plans, recommends, and implements contract strategies.
3	Surveillance Activities	Recognize PQM Contract Administrative Services (CAS) roles, responsibilities and capabilities. Perform and manage PQM CAS activities e.g., monitoring contractor deliveries and progress payments, reviews and audits of contractor facilities and processes (manufacturing and business), and evaluating manufacturing in-process reviews, non-conformance material assessments, compliance reviews, process capability studies as well as the acceptance process and Material Inspection Receiving Reports (MIRR)	BG00N50, plans and develops surveillance plans; BSC5257, directs, supervises manages testing and surveillance.

	Competency Unit*	Competency Description*	0801-General Engineering and Architecture**
4	Technology and the Industrial Base	Assess national technology and industrial base capabilities to support the design, development, production, operation, uninterrupted maintenance support of the system and eventual disposal, e.g., environmental impacts. Leverage Department of Defense industrial base programs e.g., the Manufacturing Technology Program, Defense Priorities and Allocations System, Defense Production Act Title III Program, Science and Technology program structure and Technology Readiness Levels.	BA444494, expertise in emerging technologies and develop programs in advancing state-of-the-art RAM engineering; BA469171, keeps abreast of state-of-the-art software product assurance technology; BA469171, maintains contractual support base; BA102083, acquires expertise and continuously surveys/ assesses the fuze market.
5	Systems Engineering Process	Perform the systems engineering process, (e.g., traceability of requirements (the Joint Capabilities Integration and Development System process); the maturity and stability of the evolving system design; production, quality, and manufacturing criteria for Systems Engineering Technical Reviews, and the Systems Engineering Plan). Perform the integrated product and process development ("Design-Build") approach to Concurrent Engineering, design trades for manufacturing and production (e.g., multi-year procurement and Economic Ordering Quantities), Producibility Engineering and Planning (PEP), technical risk identification, management and reporting.	BG00N50, provides technical advice on product design, manufacturing processes; BSC5457, knowledge and skill of professional engineering; BA444494, recommends approval or disapproval of design presentations affecting RAM; BA469171, knowledge of engineering interfaces, production engineering, and manufacturing technology.
6	Risk Management	Perform the risk management process and manage PQM risk and readiness.	BA102083, Makes customer aware of QED core competencies and capabilities and how to implement them in order to reduce program risks.

	Competency Unit*	Competency Description*	0801-General Engineering and Architecture**
7	Cost and Funding	Recognize funding parameters and practices to achieve program manufacturing targets and goals. Apply knowledge of cost modeling and cost analysis (e.g., sensitivity analysis). Identify manufacturing and production cost drivers, understand manufacturing cost risks, and allocation of cost targets to subsystems. Assess affordability.	BSC5257, monitors production project orders to determine fund availability and accuracy (analyzes costs).
8	Materials Management	Assess the risks associated with materials (including basic/raw materials, components, semi-finished parts, and subassemblies). Includes materials properties and maturity, security, availability (e.g., scale-up, long-lead, and single/sole/foreign sources), subcontractor management and supply chain issues, special handling, storage (hazardous materials), shelf-life, and Government Furnished Property/Material/Equipment/Facilities issues.	
9	Process Capability and Control	Appraise the risks in manufacturing processes' ability to reflect the design intent (repeatability and affordability) of key characteristics, (e.g., manufacturing modeling and simulation (product and process), manufacturing process maturity, and process yields and rates.	BG00N50, emphasize proactive control of manufacturing processes; BA444494, expertise in modeling and simulation.

	Competency Unit*	Competency Description*	0801-General Engineering and Architecture**
10	Quality Management	Appraise the risks and management efforts to control quality, and foster continuous improvement (e.g., knowledge of quality management (quality models, quality strategy, quality planning, and quality tools (such as Quality Function Deployment, Design Of Experiments, Statistical Process Control, Key Characteristics, etc.), product quality (product inspection and acceptance testing - in-process and final), cost of quality, scrap, rework and repair rates, and Material Review Board actions, and Supplier Quality Management (including supply base quality improvement).	BG00N50, provides technical expertise on statistical techniques such as Design of Experiments; BG00N50 plans and develops test and inspection programs; BA444494, expertise in probability and statistics; BA469171, serves as team lead toward improved techniques to be used in Software Quality Assurance (SQA); BA469171, implements product assurance Independent Verification and Validation (IV&V) and SQA.
11	Waste Reduction	Know, apply, interpret results of and critique contractor use of principles to reduce waste in new and existing processes to improve production efficiency and effectiveness	
12	Manufacturing Workforce	Assess the number of personnel required, as well as skills, availability, and training/certification requirements needed to support the manufacturing effort.	BA469171, directs on-the-job training and conduct formal training seminars in IV&V and SQA; BA10208, plans and executes actions to have required resources available.

	Competency Unit*	Competency Description*	0801-General Engineering and Architecture**
13	Facilities	Assess the capabilities and capacity of public or private (government or contractor) manufacturing facilities, such as, maintenance/repair depots, prime contractor, subcontractor, supplier, and vendor engineering/manufacturing plants, e.g., tooling and test equipment.	BSC5257, maintains production and maintenance facilities in a state of readiness.
14	Planning & Control	Assess and evaluate the organization of all elements needed to translate the design into an integrated and fielded system (meeting program goals for affordability and availability). E.g., manufacturing strategy development, manufacturing planning, scheduling & control, materials planning, and industrial engineering activities.	
15	Product & Process Evaluation	Establish and evaluate production and management processes to ensure that producibility, manufacturability, and quality goals will be met. Evaluate products to ensure that customer requirements are met. Conduct and establish process improvement efforts. Determine process non-compliance root cause and corrective actions. Establish and evaluate Statistical Process/Quality controls and other variability reduction efforts	BSC5257, product and process improvement; BSC5257, direct the efforts of statistical process control; BA469171, recommends improvements in software quality engineering, software system supportability, system integration, product assurance software activities, and software research.
16	Auditing & Reviews	Plan, execute and document audits or technical reviews to determine compliance with requirements, specifications, standards, and evaluation criteria. Evaluate non-compliance root cause and corrective actions for acceptance and implementation. Assess compliance to technical review gate requirements.	BG00N50, provide technical expertise on audit programs.

	Competency Unit*	Competency Description*	0801-General Engineering and Architecture**
17	Supply Chain Management	Identify critical parts and suppliers. Develop grading criteria. Analyze supplier's performance to grade/rank suppliers. Assess supplier capability. Assess supplier financial viability. Determine Requirements flow-down to suppliers and evaluate compliance.	
18	Production Support	Support production by controlling inventories, technical data and product configurations. Support production line start-up and shut down. Assess product acceptability and requirement compliance (qualification, inspections, test, and acceptance). Determine non-compliance root cause and Corrective actions. Assess and validate acceptance process and procedures and associated equipment.	BG00N050, configuration management/configuration control board member; BSC5257, establish and maintain quality control methods and techniques to produce acceptable munitions; BSC5257, conduct quality control measurements and test to produce acceptable munitions; BSC 5257, investigate customer complaints and faulty products and recommend corrective action; BA444494, failure review and corrective action; BA469171, assess software by using IV&V tools and analysis aids, automated code analyzers, requirement engineering languages and software test bed design simulators.

*Note: The information in columns titled "competency unit" and "competency description" are borrowed directly from Army Acquisition Functional Advisor for PQM, K. Leonard (personal communication, 2016).

**Note: The information in column titled "0801-General Engineering and Architecture" is borrowed directly from ACPOL (2017).

Table 6 displays the results of the evaluation of the five PDs associated with the GS-0301, Miscellaneous Administration and Program Series, job series code. This examination did not validate the 18 competency units listed in the PQM Competency

Model. Only ten (10) of the eighteen (18) competency units could be validated with this sample of PDs from the GS-0301 job series. The significant gaps identified between the PDs evaluated and the PQM Competency Model were: Surveillance Activities, Risk Management, Materials Management, Process Capability & Control, Waste Reduction, Planning and Control, Auditing and reviews, and Supply Chain Management.

Table 6. GS-0301 PD elements that support PQM Competency Unit/Description

	Competency Unit*	**Competency Description***	**0301-Miscellaneous Administration and Program Series****
1	Defense Acquisition Management Process	Understand, implement and evaluate the production, quality, and management (PQM) activities in the Department of Defense acquisition process to include the DoD 5000-Series and related policies as well as the Defense Acquisition Guide. Also includes the requirements generation process, and the Planning, Programming, Budgeting, and Execution process.	AU387546, provides technical guidance on quality matters; BT278561, reviews budget; BG20224, justifies budget for Command; BG20224, primary advocate for quality issues; BG328450, participates in acquisition integrated process teams (IPT); BG328450, actions involve support to budget process; BG328450, reviews and/or develops policies, procedures, regulations, and analyzes impact on acquisition strategies/program plans.

	Competency Unit*	Competency Description*	0301- Miscellaneous Administration and Program Series**
2	Defense Contracting Process	Identify, employ appropriate clauses, and evaluate trends in adequacy of Defense contracting instructions, regulations and policies related to PQM, industrial base, and systems. Relate defense acquisition contracting activities, such as Pre-Award, Source Selection, negotiations, Post-Award, Technical Evaluations of Contractor Cost Proposals, contracting procedures, structure (Parts) of the contract, contract modifications, changes to the contract, Data Item Descriptions, and Contract Data Requirements List. Acquisition, as well as the roles and responsibilities of the contracting, acquisition, PQM workforce.	AU387546, Assures acquisition and acceptance in accordance with FAR; BT278561, reviews work progress reports; BG328450, actions involve validation of need, review of economic payback, preparation of scopes of work, contract award, and monitoring execution.
3	Surveillance Activities	Recognize PQM Contract Administrative Services (CAS) roles, responsibilities and capabilities. Perform and manage PQM CAS activities e.g., monitoring contractor deliveries and progress payments, reviews and audits of contractor facilities and processes (manufacturing and business), and evaluating manufacturing in-process reviews, non-conformance material assessments, compliance reviews, process capability studies as well as the acceptance process and Material Inspection Receiving Reports (MIRR)	

	Competency Unit*	Competency Description*	0301- Miscellaneous Administration and Program Series**
4	Technology and the Industrial Base	Assess national technology and industrial base capabilities to support the design, development, production, operation, uninterrupted maintenance support of the system and eventual disposal, e.g., environmental impacts. Leverage Department of Defense industrial base programs e.g., the Manufacturing Technology Program, Defense Priorities and Allocations System, Defense Production Act Title III Program, Science and Technology program structure and Technology Readiness Levels.	BG20224, assess new technology; BG328450, provides industrial base expertise and support; BG 328450, development of Industrial Base strategies and reconfiguration activities; BG328450, proposes/analyzes industrial base consolidations; BG328450, prepares comprehensive industrial base management studies; BG328450, industrial preparedness planning functions; BG328450, maintains Industrial Base Assessment Tool (IBAT) for use in simulation and decision making; BG328450, prepares Defense Industrial Capabilities Assessments.

	Competency Unit*	Competency Description*	0301-Miscellaneous Administration and Program Series**
5	Systems Engineering Process	Perform the systems engineering process, (e.g., traceability of requirements (the Joint Capabilities Integration and Development System process); the maturity and stability of the evolving system design; production, quality, and manufacturing criteria for Systems Engineering Technical Reviews, and the Systems Engineering Plan). Perform the integrated product and process development ("Design-Build") approach to Concurrent Engineering, design trades for manufacturing and production (e.g., multi-year procurement and Economic Ordering Quantities), Producibility Engineering and Planning (PEP), technical risk identification, management and reporting.	BT278561, Advises on the feasibility of manufacturing new items.
6	Risk Management	Perform the risk management process and manage PQM risk and readiness.	
7	Cost and Funding	Recognize funding parameters and practices to achieve program manufacturing targets and goals. Apply knowledge of cost modeling and cost analysis (e.g., sensitivity analysis). Identify manufacturing and production cost drivers, understand manufacturing cost risks, and allocation of cost targets to subsystems. Assess affordability.	BT278561, applies systems to achieve cost and schedule, BT278561, allocates resources; BG20224, ensures quality ammunition within cots, schedule, a and performance standards.

	Competency Unit*	Competency Description*	0301-Miscellaneous Administration and Program Series**
8	Materials Management	Assess the risks associated with materials (including basic/raw materials, components, semi-finished parts, and subassemblies). Includes materials properties and maturity, security, availability (e.g., scale-up, long-lead, and single/sole/foreign sources), subcontractor management and supply chain issues, special handling, storage (hazardous materials), shelf-life, and Government Furnished Property/Material/Equipment/Facilities issues.	
9	Process Capability and Control	Appraise the risks in manufacturing processes' ability to reflect the design intent (repeatability and affordability) of key characteristics, (e.g., manufacturing modeling and simulation (product and process), manufacturing process maturity, and process yields and rates.	
10	Quality Management	Appraise the risks and management efforts to control quality, and foster continuous improvement (e.g., knowledge of quality management (quality models, quality strategy, quality planning, and quality tools (such as Quality Function Deployment, Design Of Experiments, Statistical Process Control, Key Characteristics, etc.), product quality (product inspection and acceptance testing - in-process and final), cost of quality, scrap, rework and repair rates, and Material Review Board actions, and Supplier Quality Management (including supply base quality improvement).	AU387546, supervises and provides oversight of Quality Division; AU387546, plans, directs, and administers quality assurance programs; AU387546, establishes overall quality objectives, policies, and guidelines; BT278561, seeks continuous process improvement; BG20224, develops

	Competency Unit*	Competency Description*	0301-Miscellaneous Administration and Program Series**
			an effective quality culture; BG20224, exercises final approval of expenditures to improve efficiency.
11	Waste Reduction	Know, apply, interpret results of and critique contractor use of principles to reduce waste in new and existing processes to improve production efficiency and effectiveness	
12	Manufacturing Workforce	Assess the number of personnel required, as well as skills, availability, and training/certification requirements needed to support the manufacturing effort.	AU387546, identifies required resources to accomplish objectives; AU387546, identifies training and development needs; BT278561, coordinates and manages resources to assure availability of personnel, materials, and equipment; BT278561, keeps production facilities and depot fully utilized; BT278561, keeps pace with changes

	Competency Unit*	Competency Description*	0301-Miscellaneous Administration and Program Series**
			in personnel requirements; BT278561, plans for and organizes manpower and personnel requirements; BG20224, negotiates for necessary resources of money, billets, facilities, equipment, and training; BT388838, identifies required resources to accomplish objectives; BT388838, identifies training and development needs for staff.
13	Facilities	Assess the capabilities and capacity of public or private (government or contractor) manufacturing facilities, such as, maintenance/repair depots, prime contractor, subcontractor, supplier, and vendor engineering/manufacturing plants, e.g., tooling and test equipment.	BG328450, investigation of complex technical operations identifying those facility investments required to meet production demands; BG328450, conducts capability assessment reviews.

	Competency Unit*	Competency Description*	0301-Miscellaneous Administration and Program Series**
14	Planning & Control	Assess and evaluate the organization of all elements needed to translate the design into an integrated and fielded system (meeting program goals for affordability and availability). E.g., manufacturing strategy development, manufacturing planning, scheduling & control, materials planning, and industrial engineering activities.	
15	Product & Process Evaluation	Establish and evaluate production and management processes to ensure that producibility, manufacturability, and quality goals will be met. Evaluate products to ensure that customer requirements are met. Conduct and establish process improvement efforts. Determine process non-compliance root cause and corrective actions. Establish and evaluate Statistical Process/Quality controls and other variability reduction efforts	AU387546, improves productivity, quality, effectiveness, and efficiency of missions and programs; AU387546, conducts production reviews; BG20224, promotes and implements quality improvements.
16	Auditing & Reviews	Plan, execute and document audits or technical reviews to determine compliance with requirements, specifications, standards, and evaluation criteria. Evaluate non-compliance root cause and corrective actions for acceptance and implementation. Assess compliance to technical review gate requirements.	
17	Supply Chain Management	Identify critical parts and suppliers. Develop grading criteria. Analyze supplier's performance to grade/rank suppliers. Assess supplier capability. Assess supplier financial viability. Determine Requirements flow-down to suppliers and evaluate compliance.	

	Competency Unit*	Competency Description*	0301-Miscellaneous Administration and Program Series**
18	Production Support	Support production by controlling inventories, technical data and product configurations. Support production line start-up and shut down. Assess product acceptability and requirement compliance (qualification, inspections, test, and acceptance). Determine non-compliance root cause and Corrective actions. Assess and validate acceptance process and procedures and associated equipment.	BT388838, conducts production line checks; BT388838, takes corrective action as appropriate.

*Note: The information in columns titled "competency unit" and "competency description" are borrowed directly from Army Acquisition Functional Advisor for PQM, K. Leonard (personal communication, 2016).

**Note: The information in column titled "0301-Miscellaneous Administration and Program Series" is borrowed directly from ACPOL (2017).

Table 7 shows the results of the evaluation of the five PDs associated with the GS-1150, Industrial Specialist, job series code. The results do not validate the 18 competency units listed in the PQM Competency Model. This job series came the closest to validating the PQM Competency Model on its own with seventeen (17) of the eighteen (18) competency units being found within this sample of PDs from the GS-1150 job series. There was only one gap identified between the PDs evaluated and the competency model; there was no mention of the Auditing and Reviews competency unit in the PDs.

Table 7. GS-1150 PD elements that support PQM Competency Unit/Description

	Competency Unit*	Competency Description*	1150-Industrial Specialist**
1	Defense Acquisition Management Process	Understand, implement and evaluate the production, quality, and management (PQM) activities in the Department of Defense acquisition process to include the DoD 5000-Series and related policies as well as the Defense Acquisition Guide. Also includes the requirements generation process, and the Planning, Programming, Budgeting, and Execution process.	BG350886, supports IPT with production management and production system information; BG350886, provides guidance to and develops internal policy for production managers on all life cycle phases for assigned munition systems; BG350886, provides program guidance on budget preparation and production planning; BG350886, position requires knowledge of the DoD acquisition process; H809466, provides guidance/ develops planning studies and acquisition strategies (and alternatives) for wide range of weapon programs; BG484063, ensures proper coordination and integration of acquisition strategies and provides oversight on budget and procurement related to compiles ammo items; BG484063, ensures acquisition and sustainment activities are properly coordinated and integrated; BG484063,

	Competency Unit*	Competency Description*	1150-Industrial Specialist**
			knowledge of budgeting; H8406940, expert knowledge of manufacturing policies, techniques, and regulatory requirements; H8406940, knowledge of the defense acquisition management process.
2	Defense Contracting Process	Identify, employ appropriate clauses, and evaluate trends in adequacy of Defense contracting instructions, regulations and policies related to PQM, industrial base, and systems. Relate defense acquisition contracting activities, such as Pre-Award, Source Selection, negotiations, Post-Award, Technical Evaluations of Contractor Cost Proposals, contracting procedures, structure (Parts) of the contract, contract modifications, changes to the contract, Data Item Descriptions, and Contract Data Requirements List. Acquisition, as well as the roles and responsibilities of the contracting, acquisition PQM workforce.	BG350886, provides guidance to production managers on procurement; BG350886, ensures progress accords with objectives and results in timely delivery; BG350886, reviews in progress parameters, characteristics, technical reports, plans, and estimates; BG350886, supports production managers in recognizing, analyzing, formulating, and executing solutions to real and potential problem areas that impact plans, performance, schedules, and deliveries; BG350886, evaluate proposals/bids; BG350886, statement of work preparation; BG350886; contract technical support; H809466, participates in source selection boards; H8442145, fluent in DCMA's role in DFARs

	Competency Unit*	Competency Description*	1150-Industrial Specialist**
			EVMS mission; H8406940, Developing, reviewing, approving and redirecting the contract management strategy; H8406940, responsible for changing the way contract management services are performed and recorded; H8406940, knowledge of contract administration, procurement; H8406940, experience and proficiency in pre-award surveys, physical progress reviews.
3	Surveillance Activities	Recognize PQM Contract Administrative Services (CAS) roles, responsibilities and capabilities. Perform and manage PQM CAS activities e.g., monitoring contractor deliveries and progress payments, reviews and audits of contractor facilities and processes (manufacturing and business), and evaluating manufacturing in-process reviews, non-conformance material assessments, compliance reviews, process capability studies as well as the acceptance process and Material Inspection Receiving Reports (MIRR)	BG350886, monitors and assess test results and deliveries against production requirements; H809466, develops and maintains statistical and historical industrial information on assigned facilities, sectors, and/or commodities; H809466, conducts on-site manufacturing surveys; BG484063, primary action officer for projects related to product acceptance/receipt; H8442145, review, analysis, recommendation, development, and/or coordination of policies and procedural revisions pertaining to complex

	Competency Unit*	Competency Description*	1150-Industrial Specialist**
			and/or interrelated multiple production surveillance functions; H8442145, in-depth analysis/evaluation of complex production surveillance activities; H8442145, plan and develop production surveillance; H8406940, experience and proficiency in performance of contractor purchasing system reviews (CPSR); H8406940, monitor and evaluate contractor performance.
4	Technology and the Industrial Base	Assess national technology and industrial base capabilities to support the design, development, production, operation, uninterrupted maintenance support of the system and eventual disposal, e.g., environmental impacts. Leverage Department of Defense industrial base programs e.g., the Manufacturing Technology Program, Defense Priorities and Allocations System, Defense Production Act Title III Program, Science and Technology program structure and Technology Readiness Levels.	H809466, assess industrial and technological capabilities of industries supporting DoD acquisition, logistics, and readiness; H809466, performs industrial capability analysis; H809466, identifies technologies required to design, produce, upgrade, and maintain weapon systems.

	Competency Unit*	Competency Description*	1150-Industrial Specialist**
5	Systems Engineering Process	Perform the systems engineering process, (e.g., traceability of requirements (the Joint Capabilities Integration and Development System process); the maturity and stability of the evolving system design; production, quality, and manufacturing criteria for Systems Engineering Technical Reviews, and the Systems Engineering Plan). Perform the integrated product and process development ("Design-Build") approach to Concurrent Engineering, design trades for manufacturing and production (e.g., multi-year procurement and Economic Ordering Quantities), Producibility Engineering and Planning (PEP), technical risk identification, management and reporting.	BG350886, participates in designing, changing, or implementing systems change requests that involve interfaces between multiple systems; H809466, participates in redesign; BG484063, knowledge of engineering.
6	Risk Management	Perform the risk management process and manage PQM risk and readiness.	H809466, examines factors effecting producibility of acquisitions, assesses and determines associated risk for each; H809466, analyzes degree of risk and develops problem resolutions; H809466, participates in Performance Risk Assessment Groups; H809466, assess impact of changing technology; H8406940, knowledge of project risk.

	Competency Unit*	Competency Description*	1150-Industrial Specialist**
7	Cost and Funding	Recognize funding parameters and practices to achieve program manufacturing targets and goals. Apply knowledge of cost modeling and cost analysis (e.g., sensitivity analysis). Identify manufacturing and production cost drivers, understand manufacturing cost risks, and allocation of cost targets to subsystems. Assess affordability.	BG484063, develop total ammunition profiles to include costs to produce; H8442145, Policy and strategy Earned Value Management EVM Specialist; H8406940, monitoring and evaluating costs.
8	Materials Management	Assess the risks associated with materials (including basic/raw materials, components, semi-finished parts, and subassemblies). Includes materials properties and maturity, security, availability (e.g., scale-up, long-lead, and single/sole/foreign sources), subcontractor management and supply chain issues, special handling, storage (hazardous materials), shelf-life, and Government Furnished Property/Material/Equipment/Facilities issues.	H809466, material determination and allocation; H809466, thorough knowledge and understanding of a great variety of production materials; H809466, assesses impact of competitive foreign production; H809466, evaluates sole/single source suppliers and suppliers that have inadequate capability, insufficient capacity, or are experiencing financial difficulty: H8406940, experience and proficiency in the performance of material requirements planning (MRP), inventory management and material and management accounting systems (MMAS).

	Competency Unit*	Competency Description*	1150-Industrial Specialist**
9	Process Capability and Control	Appraise the risks in manufacturing processes' ability to reflect the design intent (repeatability and affordability) of key characteristics, (e.g., manufacturing modeling and simulation (product and process), manufacturing process maturity, and process yields and rates.	H809466, Evaluates and determines the capacity and potential of manufacturing sites to produce a wide array of weapon types; H809466, coordinates the development and implementation of procedures and processes to successfully monitor and assess the effectiveness and efficiency of contractor industrial capability operations; BG484063, planning and maintenance of production capability.
10	Quality Management	Appraise the risks and management efforts to control quality, and foster continuous improvement (e.g., knowledge of quality management (quality models, quality strategy, quality planning, and quality tools (such as Quality Function Deployment, Design Of Experiments, Statistical Process Control, Key Characteristics, etc.), product quality (product inspection and acceptance testing - in-process and final), cost of quality, scrap, rework and repair rates, and Material Review Board actions, and Supplier Quality Management (including supply base quality improvement).	BG484063, Knowledge of quality control.
11	Waste Reduction	Know, apply, interpret results of and critique contractor use of principles to reduce waste in new and existing processes to improve production efficiency and effectiveness	H8406940, experience and proficiency in the performance of lean manufacturing.

	Competency Unit*	Competency Description*	1150-Industrial Specialist**
12	Manufacturing Workforce	Assess the number of personnel required, as well as skills, availability, and training/certification requirements needed to support the manufacturing effort.	BG350886, assists in identifying, distributing, and balancing workload and tasks among production in accordance with skill level; H809466, identifies essential skills required to design, produce, upgrade, and maintain weapon systems; BG484063, conducts individual analysis relating to resources.
13	Facilities	Assess the capabilities and capacity of public or private (government or contractor) manufacturing facilities, such as, maintenance/repair depots, prime contractor, subcontractor, supplier, and vendor engineering/manufacturing plants, e.g., tooling and test equipment.	BG350886, utilizes expertise in business and industry practices in relation to facilities and equipment; H809466, evaluate Defense Industrial Base (DIB) facilities and capabilities; H809466, identifies faculties/equipment required to design, produce, upgrade, and maintain weapon systems; H809466, promotes expansion of U.S. industrial capacity; BG484063, develop total ammunition profile to include production facilities (workload GOGO facilities).

	Competency Unit*	Competency Description*	1150-Industrial Specialist**
14	Planning & Control	Assess and evaluate the organization of all elements needed to translate the design into an integrated and fielded system (meeting program goals for affordability and availability). E.g., manufacturing strategy development, manufacturing planning, scheduling & control, materials planning, and industrial engineering activities.	H809466, provides guidance/develops planning studies for industrial production operations and overall schedule development; H809466, material determination and allocation; BG484063, knowledge of manufacturing; BG484063, conducts independent analysis relating to planning; BG484063, formulate new/updated planning strategies; H8406940, Experience and proficiency in performance of master production scheduling and manufacturing planning and control.
15	Product & Process Evaluation	Establish and evaluate production and management processes to ensure that producibility, manufacturability, and quality goals will be met. Evaluate products to ensure that customer requirements are met. Conduct and establish process improvement efforts. Determine process non-compliance root cause and corrective actions. Establish and evaluate Statistical Process/Quality controls and other variability reduction efforts	H809466, plans, organizes, and conducts on-site manufacturing surveys; H8406940, experience and proficiency in the performance of root cause analysis and statistical process control; H8406940, experience and proficiency in performance of producibility.
16	Auditing & Reviews	Plan, execute and document audits or technical reviews to determine compliance with requirements, specifications, standards, and evaluation criteria. Evaluate non-compliance root cause and corrective actions for acceptance and	

	Competency Unit*	Competency Description*	1150-Industrial Specialist**
		implementation. Assess compliance to technical review gate requirements.	
17	Supply Chain Management	Identify critical parts and suppliers. Develop grading criteria. Analyze supplier's performance to grade/rank suppliers. Assess supplier capability. Assess supplier financial viability. Determine Requirements flow-down to suppliers and evaluate compliance.	BG350886, provides critical product availability in support of ammunition readiness and training requirements.
18	Production Support	Support production by controlling inventories, technical data and product configurations. Support production line start-up and shut down. Assess product acceptability and requirement compliance (qualification, inspections, test, and acceptance). Determine non-compliance root cause and Corrective actions. Assess and validate acceptance process and procedures and associated equipment.	BG350886, provides mission essential production management support; BG350886, takes corrective actions; H809466, recommends effective ways to resolve production operations problems; H8442145, develops Corrective Action Plans.

*Note: The information in columns titled "competency unit" and "competency description" are borrowed directly from Army Acquisition Functional Advisor for PQM, K. Leonard (personal communication, 2016).

**Note: The information in column titled "1150-Industrial Specialist" is borrowed directly from ACPOL (2017).

Table 8 displays the results of the evaluation of the two (2) PDs associated with the GS-0830, Mechanical Engineering, job series code. The results of this examination did not validate the 18 competency units listed in the PQM Competency Model. Only two (2) samples were pulled and evaluated from this job series group because that is all I could find in FASCLASS coded as PQM level III. Only six (6) of the eighteen (18) competency units could be validated with this sample of PDs from the GS-0830 job series. The gaps identified between the PDs evaluated and the PQM Competency Model were: Defense

Contracting Process, Surveillance Activities, System Engineering Process, Cost and Funding, Materials Management, Process Capability and Control, Waste Reduction, Manufacturing Workforce, Facilities, Product and Process Evaluation, Auditing and reviews, and Supply Chain Management.

Table 8. GS-0830 PD elements that support PQM Competency Unit/Description

	Competency Unit*	**Competency Description***	**0830-Mechanical Engineering****
1	Defense Acquisition Management Process	Understand, implement and evaluate the production, quality, and management (PQM) activities in the Department of Defense acquisition process to include the DoD 5000-Series and related policies as well as the Defense Acquisition Guide. Also includes the requirements generation process, and the Planning, Programming, Budgeting, and Execution process.	BA460317; comprehensive knowledge of the DA and DoD acquisition policies and procedures; BA460317, knowledge of production processes; BA460317, knowledge of standard acquisition regulations, practices, and procedures.
2	Defense Contracting Process	Identify, employ appropriate clauses, and evaluate trends in adequacy of Defense contracting instructions, regulations and policies related to PQM, industrial base, and systems. Relate defense acquisition contracting activities, such as Pre-Award, Source Selection, negotiations, Post-Award, Technical Evaluations of Contractor Cost Proposals, contracting procedures, structure (Parts) of the contract, contract modifications, changes to the contract, Data Item Descriptions, and Contract Data Requirements List. Acquisition, as well as the roles and responsibilities of the	

	Competency Unit*	Competency Description*	0830-Mechanical Engineering**
		contracting, acquisition, PQM workforce.	
3	Surveillance Activities	Recognize PQM Contract Administrative Services (CAS) roles, responsibilities and capabilities. Perform and manage PQM CAS activities e.g., monitoring contractor deliveries and progress payments, reviews and audits of contractor facilities and processes (manufacturing and business), and evaluating manufacturing in-process reviews, non-conformance material assessments, compliance reviews, process capability studies as well as the acceptance process and Material Inspection Receiving Reports (MIRR)	
4	Technology and the Industrial Base	Assess national technology and industrial base capabilities to support the design, development, production, operation, uninterrupted maintenance support of the system and eventual disposal, e.g., environmental impacts. Leverage Department of Defense industrial base programs e.g., the Manufacturing Technology Program, Defense Priorities and Allocations System, Defense Production Act Title III Program, Science and Technology program structure and Technology Readiness Levels.	BA460317, keeps abreast of current developments in science and engineering for the advancement of the technological base and evolution of new design concepts; BA460317, evaluates new technologies to meet Army munition system requirements; BA460317, assess the impact of new technology on current systems and processes.

	Competency Unit*	Competency Description*	0830-Mechanical Engineering**
5	Systems Engineering Process	Perform the systems engineering process, (e.g., traceability of requirements (the Joint Capabilities Integration and Development System process); the maturity and stability of the evolving system design; production, quality, and manufacturing criteria for Systems Engineering Technical Reviews, and the Systems Engineering Plan). Perform the integrated product and process development ("Design-Build") approach to Concurrent Engineering, design trades for manufacturing and production (e.g., multi-year procurement and Economic Ordering Quantities), Producibility Engineering and Planning (PEP), technical risk identification, management and reporting.	
6	Risk Management	Perform the risk management process and manage PQM risk and readiness.	BA460317, Assesses risks to program and initiates risk management/mitigation efforts.
7	Cost and Funding	Recognize funding parameters and practices to achieve program manufacturing targets and goals. Apply knowledge of cost modeling and cost analysis (e.g., sensitivity analysis). Identify manufacturing and production cost drivers, understand manufacturing cost risks, and allocation of cost targets to subsystems. Assess affordability.	
8	Materials Management	Assess the risks associated with materials (including basic/raw materials, components, semi-finished parts, and subassemblies). Includes materials properties and maturity, security, availability (e.g., scale-up, long-lead, and single/sole/foreign sources), subcontractor management and supply chain issues, special handling, storage (hazardous	

	Competency Unit*	Competency Description*	0830-Mechanical Engineering**
		materials), shelf-life, and Government Furnished Property/Material/Equipment/Facilities issues.	
9	Process Capability and Control	Appraise the risks in manufacturing processes' ability to reflect the design intent (repeatability and affordability) of key characteristics, (e.g., manufacturing modeling and simulation (product and process), manufacturing process maturity, and process yields and rates.	
10	Quality Management	Appraise the risks and management efforts to control quality, and foster continuous improvement (e.g., knowledge of quality management (quality models, quality strategy, quality planning, and quality tools (such as Quality Function Deployment, Design Of Experiments, Statistical Process Control, Key Characteristics, etc.), product quality (product inspection and acceptance testing - in-process and final), cost of quality, scrap, rework and repair rates, and Material Review Board actions, and Supplier Quality Management (including supply base quality improvement).	BA431599, coaches and mentors team members engaged in Quality Engineering; BA431599, identifies weaknesses, corrective actions, and programs for continuous improvement.
11	Waste Reduction	Know, apply, interpret results of and critique contractor use of principles to reduce waste in new and existing processes to improve production efficiency and effectiveness	
12	Manufacturing Workforce	Assess the number of personnel required, as well as skills, availability, and training/certification requirements needed to support the manufacturing effort.	

	Competency Unit*	Competency Description*	0830-Mechanical Engineering**
13	Facilities	Assess the capabilities and capacity of public or private (government or contractor) manufacturing facilities, such as, maintenance/repair depots, prime contractor, subcontractor, supplier, and vendor engineering/manufacturing plants, e.g., tooling and test equipment.	
14	Planning & Control	Assess and evaluate the organization of all elements needed to translate the design into an integrated and fielded system (meeting program goals for affordability and availability). E.g., manufacturing strategy development, manufacturing planning, scheduling & control, materials planning, and industrial engineering activities.	BA460317, expert knowledge in principles of planning and program management.
15	Product & Process Evaluation	Establish and evaluate production and management processes to ensure that producibility, manufacturability, and quality goals will be met. Evaluate products to ensure that customer requirements are met. Conduct and establish process improvement efforts. Determine process non-compliance root cause and corrective actions. Establish and evaluate Statistical Process/Quality controls and other variability reduction efforts	
16	Auditing & Reviews	Plan, execute and document audits or technical reviews to determine compliance with requirements, specifications, standards, and evaluation criteria. Evaluate non-compliance root cause and corrective actions for acceptance and implementation. Assess compliance to technical review gate requirements.	
17	Supply Chain Management	Identify critical parts and suppliers. Develop grading criteria. Analyze supplier's performance to grade/rank suppliers. Assess supplier capability. Assess supplier financial viability.	

	Competency Unit*	Competency Description*	0830-Mechanical Engineering**
		Determine Requirements flow-down to suppliers and evaluate compliance.	
18	Production Support	Support production by controlling inventories, technical data and product configurations. Support production line start-up and shut down. Assess product acceptability and requirement compliance (qualification, inspections, test, and acceptance). Determine non-compliance root cause and Corrective actions. Assess and validate acceptance process and procedures and associated equipment.	BA460317, supports the future development of manufacturing programs/production.

*Note: The information in columns titled "competency unit" and "competency description" are borrowed directly from Army Acquisition Functional Advisor for PQM, K. Leonard (personal communication, 2016).

**Note: The information in column titled "0830-Mechanical Engineering" is borrowed directly from ACPOL (2017).

The analysis of the PDs did collectively validate the PQM Competency Model and the analysis also identified areas in the PQM coded PDs that can be improved upon if this PQM Competency Model is ever approved by the PQM FIPT Chair. Hiring managers, in charge of PQM coded positions, need to better understand the PQM competency units and descriptions. Also, the hiring managers need to fully understand the acquisition related duties the Level III PQM coded positions are effectively performing to meet the mission. If the acquisition professionals' "skill and competency gaps" truly "undermine the DoD's ability to meet vital missions," then the hiring managers need to build these competency units/descriptions into the PQM coded position descriptions (GAO, 2013, pp. 9, 9).

C. TERTIARY RESEARCH FINDINGS

The third analysis performed was to determine if the Competency model could be validated by the AT&L Workforce Position Category Description (PCD). I looked for at least one related element in the Position Category Description for each competency unit.

Table 9 displays the results of the evaluation of the PQM PCD against the PQM Competency Model. The results of the analysis did not validate the 18 competency units listed in the PQM Competency Model. Only eleven (11) of the eighteen (18) competency units could be validated using the most current PQM PCD document. The gaps identified between the PCD and the competency model were: Cost and Funding, Materials Management, Waste Reduction, Facilities, Planning and Control, Product and Process Evaluation, and Supply Chain Management.

Table 9. PQM Position Category Description elements that support PQM Competency Unit/Description

	Competency Unit*	**Competency Description***	**PQM PCD****
1	Defense Acquisition Management Process	Understand, implement and evaluate the production, quality, and management (PQM) activities in the Department of Defense acquisition process to include the DoD 5000-Series and related policies as well as the Defense Acquisition Guide. Also includes the requirements generation process, and the Planning, Programming, Budgeting, and Execution process.	Provides advice, assistance and recommendations to support “make” or “buy” decisions and alternative production processes.

	Competency Unit*	Competency Description*	PQM PCD**
2	Defense Contracting Process	Identify, employ appropriate clauses, and evaluate trends in adequacy of Defense contracting instructions, regulations and policies related to PQM, industrial base, and systems. Relate defense acquisition contracting activities, such as Pre-Award, Source Selection, negotiations, Post-Award, Technical Evaluations of Contractor Cost Proposals, contracting procedures, structure (Parts) of the contract, contract modifications, changes to the contract, Data Item Descriptions, and Contract Data Requirements List. Acquisition, as well as the roles and responsibilities of the contracting, acquisition, PQM workforce.	Performs production/manufacturing surveillance/oversight of Defense Contractors, their associated production/service sub-contractors, and organic/inorganic Industrial Base activities, which provide supplies and/or services. This includes reviews during both pre-award and post-award activities (e.g., proposal review, post-award conferences).
3	Surveillance Activities	Recognize PQM Contract Administrative Services (CAS) roles, responsibilities and capabilities. Perform and manage PQM CAS activities e.g., monitoring contractor deliveries and progress payments, reviews and audits of contractor facilities and processes (manufacturing and business), and evaluating manufacturing in-process reviews, non-conformance material assessments, compliance reviews, process capability studies as well as the acceptance process and Material Inspection Receiving Reports (MIRR)	Performs production/manufacturing surveillance/oversight of Defense Contractors, their associated production/service sub-contractors, and organic/inorganic Industrial Base activities, which provide supplies and/or services. This includes reviews during both pre-award and post-award activities (e.g., proposal review, post-award conferences).

	Competency Unit*	Competency Description*	PQM PCD**
4	Technology and the Industrial Base	Assess national technology and industrial base capabilities to support the design, development, production, operation, uninterrupted maintenance support of the system and eventual disposal, e.g., environmental impacts. Leverage Department of Defense industrial base programs e.g., the Manufacturing Technology Program, Defense Priorities and Allocations System, Defense Production Act Title III Program, Science and Technology program structure and Technology Readiness Levels.	Performs Industrial Base capability and capacity studies.
5	Systems Engineering Process	Perform the systems engineering process, (e.g., traceability of requirements (the Joint Capabilities Integration and Development System process); the maturity and stability of the evolving system design; production, quality, and manufacturing criteria for Systems Engineering Technical Reviews, and the Systems Engineering Plan). Perform the integrated product and process development ("Design-Build") approach to Concurrent Engineering, design trades for manufacturing and production (e.g., multi-year procurement and Economic Ordering Quantities), Producibility Engineering and Planning (PEP), technical risk identification, management and reporting.	Ensures QA plans are integrated into the systems engineering process.

	Competency Unit*	Competency Description*	PQM PCD**
6	Risk Management	Perform the risk management process and manage PQM risk and readiness.	Conducts assessments of producibility and manufacturing feasibility and risk throughout the system acquisition process.
7	Cost and Funding	Recognize funding parameters and practices to achieve program manufacturing targets and goals. Apply knowledge of cost modeling and cost analysis (e.g., sensitivity analysis). Identify manufacturing and production cost drivers, understand manufacturing cost risks, and allocation of cost targets to subsystems. Assess affordability.	
8	Materials Management	Assess the risks associated with materials (including basic/raw materials, components, semi-finished parts, and subassemblies). Includes materials properties and maturity, security, availability (e.g., scale-up, long-lead, and single/sole/foreign sources), subcontractor management and supply chain issues, special handling, storage (hazardous materials), shelf-life, and Government Furnished Property/Material/Equipment/Facilities issues.	
9	Process Capability and Control	Appraise the risks in manufacturing processes' ability to reflect the design intent (repeatability and affordability) of key characteristics, (e.g., manufacturing modeling and simulation (product and process), manufacturing process maturity, and process yields and rates.	Performs Data Collection and Analysis related to quality of manufacturing and production along with executive process performance and process capability analysis.

	Competency Unit*	Competency Description*	PQM PCD**
10	Quality Management	Appraise the risks and management efforts to control quality, and foster continuous improvement (e.g., knowledge of quality management (quality models, quality strategy, quality planning, and quality tools (such as Quality Function Deployment, Design Of Experiments, Statistical Process Control, Key Characteristics, etc.), product quality (product inspection and acceptance testing - in-process and final), cost of quality, scrap, rework and repair rates, and Material Review Board actions, and Supplier Quality Management (including supply base quality improvement).	Manages Quality Assurance (QA) processes to establish essential quality standards and controls. Develops, executes and evaluates policies, procedures, plans and test provisions for QA requirements throughout the various phrases of the systems acquisition cycle. Provides expert support and guidance on QA-related matters to other program office and in-plant functional acquisition personnel. Accepts and fields Materiel for U.S. and foreign customers. Prepare sampling plans to assure Product Quality for materiel acceptance. Conducts Continual Improvement activities for cost of poor quality.
11	Waste Reduction	Know, apply, interpret results of and critique contractor use of principles to reduce waste in new and existing processes to improve production efficiency and effectiveness	
12	Manufacturing Workforce	Assess the number of personnel required, as well as skills, availability, and training/certification requirements needed to support the manufacturing effort.	Assesses and reports on the availability of resources for production and realistic industry approaches to manufacturing and supply chain management.

	Competency Unit*	Competency Description*	PQM PCD**
13	Facilities	Assess the capabilities and capacity of public or private (government or contractor) manufacturing facilities, such as, maintenance/repair depots, prime contractor, subcontractor, supplier, and vendor engineering/manufacturing plants, e.g., tooling and test equipment.	
14	Planning & Control	Assess and evaluate the organization of all elements needed to translate the design into an integrated and fielded system (meeting program goals for affordability and availability). E.g., manufacturing strategy development, manufacturing planning, scheduling & control, materials planning, and industrial engineering activities.	
15	Product & Process Evaluation	Establish and evaluate production and management processes to ensure that producibility, manufacturability, and quality goals will be met. Evaluate products to ensure that customer requirements are met. Conduct and establish process improvement efforts. Determine process non-compliance root cause and corrective actions. Establish and evaluate Statistical Process/Quality controls and other variability reduction efforts	
16	Auditing & Reviews	Plan, execute and document audits or technical reviews to determine compliance with requirements, specifications, standards, and evaluation criteria. Evaluate non-compliance root cause and corrective actions for acceptance and implementation. Assess compliance to technical review gate requirements.	Performs process and product-oriented reviews and audits to ensure compliance with QA requirements

	Competency Unit*	Competency Description*	PQM PCD**
17	Supply Chain Management	Identify critical parts and suppliers. Develop grading criteria. Analyze supplier's performance to grade/rank suppliers. Assess supplier capability. Assess supplier financial viability. Determine Requirements flow-down to suppliers and evaluate compliance.	
18	Production Support	Support production by controlling inventories, technical data and product configurations. Support production line start-up and shut down. Assess product acceptability and requirement compliance (qualification, inspections, test, and acceptance). Determine non-compliance root cause and Corrective actions. Assess and validate acceptance process and procedures and associated equipment.	Assist in the identification of, root cause analysis, and corrective action for the disposition of non-conforming materiel. This includes activities such as participating in Material Review Boards and/or Corrective Action Boards, and processing Product Quality Deficiency Reports.

*Note: The information in columns titled "competency unit" and "competency description" are borrowed directly from Army Acquisition Functional Advisor for PQM, K. Leonard (personal communication, 2016).

**The information in column titled "PQM PCD" is borrowed directly from Defense Acquisition University (2016).

If the purpose the PQM PCD document is to ensure that position descriptions are coded correctly as PQM acquisition positons, then all 18 competency units should be included in the PCD document. This analysis has brought to light some areas where the PCD can be improved, especially if the PQM Competency Model is an accurate reflection of the PQM workforce skills and competencies needed to meet vital DoD missions.

D. SUMMARY

The PQM Competency Model was validated by the DAU learning objectives from the courses required for PQM certification levels I, II, and III. The PQM Competency Model was also validated by the collective PQM Level III coded PDs sampled that represent 85% of the Army PQM workforce. The PQM Competency Model was not validated by the PQM PCD. Areas where DAU training could be further developed and

improved based on the PQM Competency Model were identified. Areas where specific job series PDs could be further developed and improved based on the PQM Competency Model were also identified. Finally, the competency units that need to be added to the PQM PCD were also identified.

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V. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS OF THE STUDY AND RECOMMENDATIONS

This study answered the primary research question. When comparing the PQM Competency Model against the DAU PQM core certification standards and learning objectives; the PQM competency model was fully validated by the learning objectives. All of the competencies can be found in at least one of the learning objectives that make up the core certification standards for PQM level I, II, and III. Based on what DAU is training the PQM career field on, the competency model is accurate. The two competencies called Manufacturing Workforce and Facilities only had two and one learning objectives associated with them respectively. DAU may want to consider adding more learning objectives on these two PQM competencies units.

Further research is needed to determine how well each competency unit is covered in the course content for each learning objective; as this research only related the intent of the learning objective to the intent of the competency unit. Figure 12 summarizes the DAU course number and competency unit data to give the DAU community a quick view of the competency units in relation to where they are covered in the DAU PQM certification course material. DAU could look at this issue further to see if each learning objective suffiently maps to the PQM competency model, they may find that their learning objective needs refined or updated, or maybe they need to spread out the competency model units and descriptions a little more throughout the curriculum. Some of the DAU courses for PQM certification may be covering topics they do not need to cover as well, if the learning objective does not map to the PQM competency model.

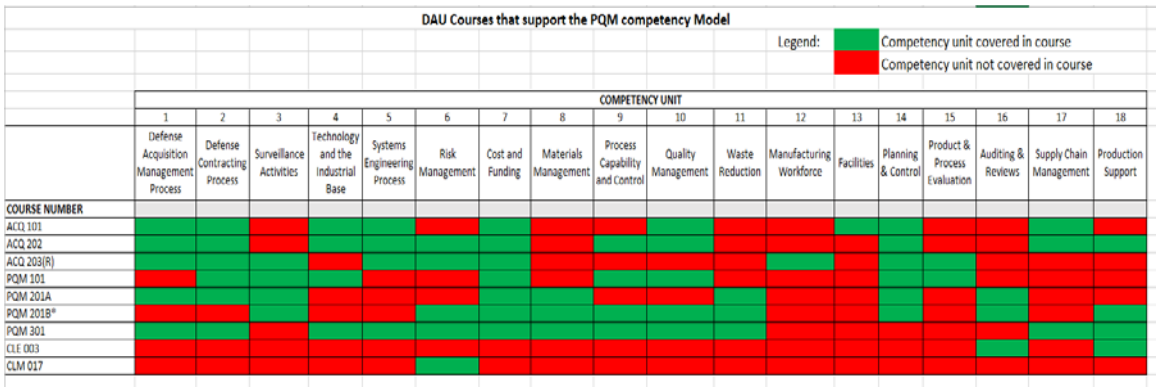

Figure 12. DAU Courses that Support the PQM Competency Model

This study answered the secondary research question satisfactorily. The18 competency unit descriptions described in the PQM Competency Model were validated based on all of the major duties and knowledge required by the top five PQM coded position descriptions which represents 85% of the PQM workforce. No single job series sample of level III PQM coded position descriptions could validate the competency model; it took all 22 samples collectively, of the top five level III coded PQM position descriptions, to validate the competency model. I recommend that the hiring managers look at the competencies required by the PQM career field when they write or update their PQM coded Position Descriptions. The Army should consider improving the education of managers about the acquisition position competency models and the PQM FIPT chair needs to get the PQM model finalized so that the Competency Model can be disseminated. Managers need to understand what is expected of the DoD PQM acquisition community so they can apply the correct competencies to their PQM acquisition positions. Without an approved PQM Competency Model, the hiring managers are shooting in the dark when updating PDs with no guidance other than the classification standards put out by OPM. Further research is needed to see if the OPM classification standards for the job series most likely to be coded as PQM acquisition positions have the competencies listed in them, since this is the only guidance hiring managers have for writing and updating the position descriptions. Figure 13 will help the hiring manager to update and include the competency units if the position requires these competencies.

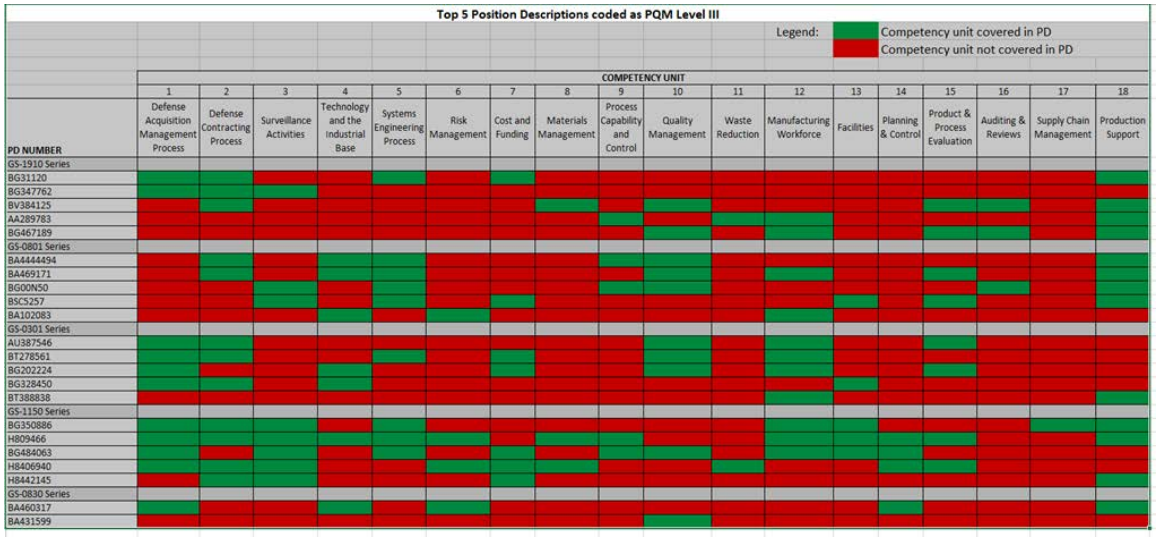

Figure 13. Top Five Position Descriptions Coded as PQM Level III

In regard to the tertiary research question, the 18 competency unit descriptions described in the PQM Competency Model could not be validated based on the AT&L Workforce Position Category Description (PCD). Seven of the 18 competency units were not addressed in the PCD document. I recommend the developers of the PQM PCD document incorporate all 18 of the competency units in some way if all 18 PQM competency units are truly important to the PQM profession. Also, since the PQM PCD document is used to determine if a PD should be coded as a PQM acquisition position, the PCD should list all competencies required by a PQM position. The individual job series PD may not list all of the PQM competencies because the job does not require that particular position to have all 18 competencies (skills, knowledge, ability), but the PD can only be coded as PQM if the PD meets 51% of the duties listed in the PQM PCD. If all of the competencies are not listed in the PQM PCD, a positon may in fact need to be coded as PQM, but it may have fallen thru the cracks because the competencies listed in the PD were not listed in the PQM PCD. I recommend the next time there is a PQM Leadership Workshop that the PCD be updated to reflect all 18 competency units, based on the findings in this research. Below in Figure Z is a chart to guide the PQM leaders to update the PCD.

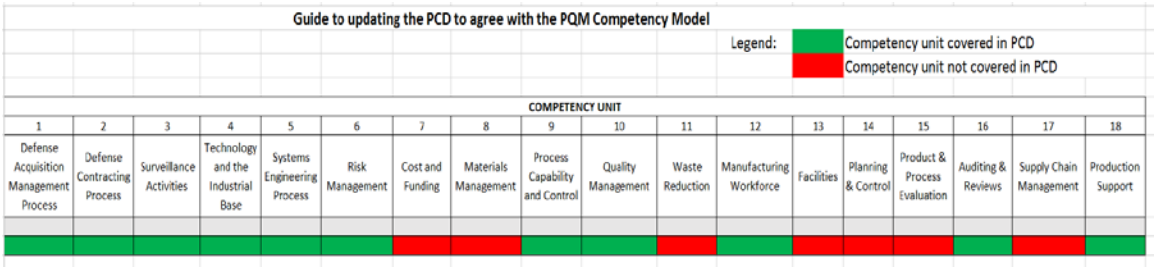

Figure 14. Guide to updating the PCD to agree with the PQM Competency Model

B. FUTURE RESEARCH

More thorough research is needed to determine whether or not the information taught in the DAU courses to satisfy the learning objectives reflects the desired competencies. This project only considered the intent of the learning objective and not a deep dive into the course material. It is unclear how well each learning objective matches the intent of each competency unit description.

The literary review and examination of position descriptions was limited to FASCLASS, a United States Army Civilian Personnel managed system. The FASCLASS system is very Army focused with a few other associated agencies such as the: Civilian Human Resources Agency (CHRA); Defense Information Systems Agency (DISA); Defense Health Agency (DHA); Defense Finance and Accounting Service (DFAS); Senior Executive Service (SES); Defense Contract Management Agency (DCMA); and the National Guard. The literary review did not include the entire DoD PQM population (i.e., Navy, Marines, Air Force, Coast Guard), only the Army PQM population PDs were assessed.

Even though the PQM competency model can be validated by the DAU learning objectives for PQM level I, II, and III and by the top five job series coded as level III PQM position descriptions, more research is need to determine if the 18 competency units are the correct competency units for the PQM workforce. I'm not sure that the PQM level III coded position descriptions sampled were the best representative samples of the PQM population who performs PQM functions most effectively; level I and Level II coded positons could also be representative samples. Based on the fact that I was asked, via email,

to take part in a PQM competency gap assessment survey as a member of the PQM workforce in July of 2017, it appears research is presently being conducted by the Army DACM office to determine if the correct competency units are being utilized in the 2016 PQM Competency Model. Results are still pending for the survey, unrelated to this project, as of the publishing date of this research.

Further research is needed to determine if Army positions are being properly coded as PQM acquisition positions based on the PQM PCD. There are some gaps between the PQM Competency Model and the PQM PCD; therefore, some positions that should be coded as PQM acquisition positions may not be coded correctly because the PQM competencies (knowledge, skills, and abilities) were not listed in the PQM PCD.

I recommend that each FIPT responsible for validating their functional competency model apply this type of analysis to validate their respective competency model. The analysis should start with a thorough review of the DAU learning objectives from each certification course, followed by a review of the top 5 job series position descriptions, followed by a review of the functional Position Category Description. By reviewing this data against the competency units and descriptions in the functional competency model a determination can be made if the functional Competency Model can be validated. Also, gaps can be identified in the DAU courses, position descriptions and the position category description. It is a win-win analysis.

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LIST OF REFERENCES

Army Civilian Personnel On Line. (2017). Retrieved July 3–7, 2017 from https://acpol2.army.mil/fasclass/search_fs/search_fasclass.asp

Clark, D. R. (2004). *Concepts of leadership*. Retrieved from http://nwlink.com/~donclark/leader/leadcon.html

Competency Model Clearinghouse. (n.d.). Develop a competency model. Retrieved 18 April, 2018 from https://www.careeronestop.org/competencymodel/userguide_competency.aspx

DAU Acquisition Encyclopedia. (2017). Retrieved October 17, 2017 from https://www.dau.mil/acquipedia/Pages/ArticleDetails.aspx?aid=a2af5b6a-1b2a-44a6-bb1a-f12e97450f79

Defense Acquisition University. (2016). AT&L workforce position category description. Retrieved August 6, 2016 from https://myclass.dau.mil/bbcswebdav/institution/z_PORTAL_RESOURCES/iCatalog%20and%20SIS%20Web%20FIles/Position_Category_Descriptions/PCD%20PQM.pdf

Defense Acquisition University. (2017a). iCatalog Home Training Courses and Schedules. Retrieved February 14, 2017 from http://icatalog.dau.mil/onlinecatalog/tabnav.aspx

Defense Acquisition University. (2017b). PQM Career Page. Retrieved May 30, 2017 from https://dap.dau.mil/career/pqm/Pages/Default.aspx

Defense Acquisition Workforce Improvement Act, 10 U.S.C. Chapter 87 §1701a (2011). Retrieved June 15, 2018 from http://uscode.house.gov/statviewer.htm?volume=124&page=4299

Defense Civilian Personnel Advisory Service. (2016, February 2). *DoD competency development subject matter expert (SME) Panel 1*. Presented to Subject Matter Expert (SME) Competency Development Panel 1 on February 2–3, 2016. Via teleconference. Obtained by author from Kathleen Leonard through email dated October 21, 2016.

Department of Defense. (2006). *A desk guide for Acquisition, technology, and logistics workforce career management.* Retrieved March 4, 2017 from http://www.hci.mil/docs/Policy/Guidance%20Memoranda/24.%20Issuance%20of%20the%20ATL%20Workforce%20Desk%20Guide.pdf

Department of Defense. (2016). DoDI 1400.25-V250, *DoD civilian personnel management system: Civilian strategic human capital planning (SHCP).* Retrieved February 3, 2017 from http://www.esd.whs.mil/Portals/54/Documents/DD/issuances/140025/140025_vol250.pdf

Government Accountability Office. (2013). *Human capitol, critical skills and competency assessments should help guide DoD civilian workforce decisions* (GAO-13-188). Washington, DC: Author.

Human Capitol Initiatives. (2017). *Defense acquisition workforce key information overall as of FY17Q2 (31 March 2017)*. Retrieved on October 18, 2017 from http://www.hci.mil/docs/Workforce_Metrics/FY17Q2/Overall_Key_Information_FY17Q2.pdf

Icatalog DAU. (n.d.). *Certification standards and core plus development guide production, quality, and manufacturing*. Retrieved October 19, 2017 from http://icatalog.dau.mil/onlinecatalog/CareerLvl.aspx?lvl=1&cfld=8

Junior, J. B. (2016, July 19). *Army PQM statistics: Data from DCPDS as of 2–16*. Presented at Army PQM Acquisition Leadership Workshop, Defense Acquisition University (DAU) South in Huntsville, AL.

Life Cycle Management and Product Support. (2016). 10 USC §2337. Retrieved from http://uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title10-section2337&num=0&edition=prelim

Mandelbaum, J., Patterson, C., Hurt, P., & Shae-Keenan, M. (2012). IDA Paper NS P-4927, *Aerospace and defense manufacturing competency model—Improving communication among employers, training providers, and the workforce.* Retrieved January 1, 2017 from https://view.officeapps.live.com/op/view.aspx?src=http%3A%2F%2Fdodmrl.com%2F2012_workshop%2FModel%2520read%2520ahead.doc

MindTools Club. (n.d.). *Developing a competency framework: Linking company objectives and personal performance.* Retrieved October 18, 2017 from https://www.mindtools.com/community/pages/article/newISS_91.php

Needham, J. K. (2010). *Defense acquisition workforce, DoD's training program demonstrates many attributes of effectiveness, but improvement is needed* (GAO-11-22). Washington, DC: Government Accountability Office.

Office of Personnel Management. (n.d.). Frequently asked questions, classification, *What is a position description?* Retrieved February 3, 2017 from https://www.opm.gov/FAQS/QA.aspx?fid=d2dc8952-41ec-434a-ac7e-bcb6ee8206ba&pid=c9df01f3-8580-4f87-88a4-3e26125f1205

Office of the Deputy Assistant Secretary of Defense (ODASD) Systems Engineering. (2015). Retrieved October 17, 2017 from http://www.acq.osd.mil/se/wr/wr-pqm.html

Office of the Deputy Assistant Secretary of Defense (ODASD) Systems Engineering. (2017). Retrieved October 18, 2017 from http://www.acq.osd.mil/se/wr/index.html

Torelli, N. (2009, May 12). *DoD Production, Quality, and Manufacturing (PQM) and Systems Engineering (SE) Update*. Presented at National Defense Industrial Association (NDIA) Joint Committee on Systems Engineering and Manufacturing.

United States Army Organic Industrial Base Strategic Plan (AOIBSP) 2012–2022 (2012). Retrieved October 17, 2017 from https://www.army.mil/e2/c/downloads/276549.pdf

United States Department of Labor (2015). *Guide for developing competency models*. Retrieved February 11, 2018 from https://www.careeronestop.org/CompetencyModel/Info_Documents/Guide-for-Developing-CompetencyModels.pdf

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