Aligning Program MANAGEMENT COMPETENCIES to Industry Standards

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The 2020 National Defense Authorization Act mandated that acquisition career fields realign their certification requirements to be based on the nationally recognized standards of an accredited third party. This study offers recommendations for improving the DoD program management (PM) training standards by providing traceability between the DoD PM competencies and the Project Management Institute (PMI)'s standards for project, program, and portfolio management. The study elaborates on the extent of alignment, finding that 96% of the DoD PM competency elements align to PMI standards. Areas of misalignment identify opportunities to augment DoD PM training and highlight areas where DoD PM training deviates from industry standards.

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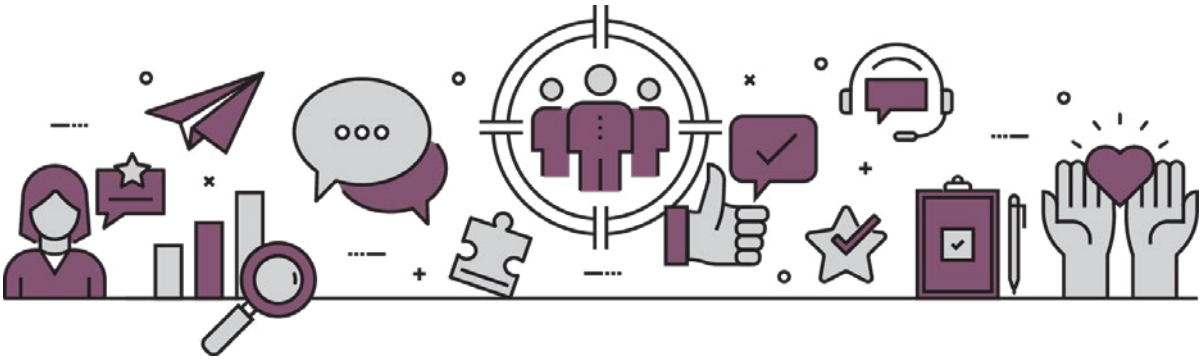
Image designed by Nicole Brate

The purpose of this research is to understand the extent to which the Department of Defense (DoD)'s program management (PM) functional career field competencies currently align with the internationally recognized standards for project, program, and portfolio management. This research will be used to make recommendations to the DoD on the best way to transition from its current PM certification requirements to certification requirements based on industry standards. We provide traceability between the DoD PM competencies and industry standards, and elaborate on the extent to which they are aligned. We also highlight inconsistencies and make recommendations for changes in DoD training and education standards and for potential policy changes.



Over decades, the DoD has been criticized for its inability to manage the various programs funded by U.S. taxpayers. These repeated failings in the realms of program cost, schedule, and performance have been documented in numerous reports from the Office of the Secretary of Defense (OSD) and the Government Accountability Office (GAO), and in a myriad of theses and dissertations (Bond et al., 2016; Choi, 2009; Defense Acquisition Workforce Improvement Act [DAWIA], 1990; GAO, 2019a, 2019b; Kupec, 2013; Pernin et al., 2012; President's Blue Ribbon Commission, 1986; Redshaw, 2011).

A debate continues as to whether the acquisition program failings are caused by the DoD's inherently complex acquisition system or the quality of its acquisition personnel. Eckerd and Snider (2017) claim that until the acquisition system and processes of the DoD are fixed, the training and education of program managers can be considered inconsequential to the success of defense programs. However, based on the recommendations in GAO-18-217, which was focused on improving program management, the DoD's program performance would improve if the DoD would "improve practices that do not align extensively with leading practices" (GAO, 2018a). This recommendation is further supported by the GAO's annual high-risk list, which highlights the DoD career fields that pose a great level of risk to the government if not

improved or appropriately monitored. DoD weapon systems acquisition has consistently been on this list consistently since 1990 (General Accounting Office, 1995; GAO, 2019a). According to the most recent list developed in 2019, DoD program management was considered high risk because of the anticipated $1.66 trillion investments into its acquisition and procurement portfolio (GAO, 2019a). After decades of continuous defense acquisition reform initiatives, still no effort can guarantee resolution of the continued shortfalls in meeting cost, schedule, and performance goals for acquisition programs (GAO, 2019a). These three factors are commonly referred to as a program's triple constraint and form the acquisition program baseline for management.

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The DoD has made many attempts to develop solutions meant to resolve continued issues with managing the nation's defense programs and their planned cost, schedule, and performance baselines. One such attempt was implemented under President Reagan's Blue Ribbon Commission, also commonly referred to as the Packard Commission. As it pertains to this research study, the Packard Commission's most relevant recommendation was to require business-related education and training for acquisition personnel (President's Blue Ribbon Commission, 1986). This recommendation led to the passing of the DAWIA, which then led to the establishment of the Defense Acquisition University (DAU). Since its inception in 1991, DAU has structured its acquisition curriculum in a way that would best prepare program managers (PM) to navigate the complexities of the Defense Acquisition System (DAS). The principal components of the DAS consist of the interoperation of management processes (the Adaptive Acquisition Framework), requirements processes (like the Joint Capabilities Integration and Development System [JCIDS] for formal programs of record), and a resourcing process (referred to as the planning, programming, budgeting, and execution [PPBE] system) (Office of the Under Secretary of Defense for Acquisition and Sustainment [OUSD(A&S)], 2020a, 2020b).

In 2016, the Office of the Assistant Secretary of Defense for Acquisition distributed the functional career field competencies for PMs and broke them down into the following DoD PM categories: Acquisition Management, Business Management, Technical Management, and Executive Leadership (MacStravic, 2016). From the DoD's perspective, these competencies serve as the standards that enable PMs to effectively "deliver mission-critical capabilities in terms of equipment and services" (MacStravic, 2016, p. 2). Further, this list of competencies serves as the basis for the PM DAWIA certification standards adopted by the Services.

The Project Management Institute (PMI) is an independent, private organization that has led the way in establishing the internationally recognized standards for project management, program management, and portfolio management across industries. They offer a variety of certifications to business and management professionals that are recognized globally. Since 1999, the American National Standards Institute (ANSI) has approved PMI's *Guide to the Project Management Body of Knowledge*® (*PMBOK Guide*) (PMI, 2017a) as the American national standard for project management (Holtzman, 1999). A contributing factor to the *PMBOK Guide*'s ANSI certification is its wide range of applicability across industries. The knowledge areas in PMI's *PMBOK Guide*, the performance domains of *The Standard for Portfolio Management* (*TSPfM*) (PMI, 2017b), and *The Standard for Program Management* (*TSPgM*) (PMI, 2017c) apply broadly.

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In December 2019, Congress passed the National Defense Authorization Act for Fiscal Year 2020 (NDAA). The section of this Act that is relevant to this research is Section 861, "Defense Acquisition Workforce Certification, Education, and Career Fields," subsection (c), "Professional Certification." It states,

> The Secretary of Defense shall implement a certification program to provide for a professional certification requirement for all members of the acquisition workforce … the certification requirement for any

> acquisition workforce career field shall be based on standards developed by a third-party accredited program based on nationally or internationally recognized standards. (NDAA, 2019)

This subsection has mandated a refocusing of how the DoD trains its acquisition professionals. Per the NDAA, it is the role of the Office of the Secretary of Defense to produce the realigned certification program based on nationally or internationally recognized standards of an accredited third party (NDAA, 2019). Per the DAWIA (1990), it is DAU's role to provide the training that meets the requirements of the acquisition workforce.

Research Questions

This research will be used to make recommendations to the DoD on the best way to transition from its current PM certification requirements to certification requirements based on the PMI standards. This study answers the following research questions:

- To what extent are the DoD's program management competency elements at the basic, intermediate, and advanced DAWIA levels aligned with PMI's *PMBOK Guide*, *TSPgM*, and *TSPfM*?
- To what extent are the knowledge areas and performance domains in PMI's *PMBOK Guide*, *TSPgM*, and *TSPfM* aligned with the DoD's program management competency elements at the basic, intermediate, and advanced DAWIA levels?

The results of this study will enable decision-makers within the OSD to make informed decisions about modifying the PM certification requirements as mandated by the NDAA. This research focuses on a shift in the basis for DoD PM certification requirements. Specifically, this study

pertains to the alignment of the DoD's PM functional career field competencies (MacStravic, 2016) to the PMI's 10 knowledge areas that comprise the *PMBOK Guide* (PMI, 2017a), the portfolio management performance domains of *TSPfM* (PMI, 2017b), and the program management performance domains of *TSPgM* (PMI, 2017c).

Background and Literature Review

The study of PM career field competencies can be linked to work and progress in other acquisition workforce career fields (Rendon, 2010). As Rendon (2019) discusses, it is important to make an organization auditable so that it will be better suited to achieve its mission goals and objectives. Auditability consists of three main components: capable processes, effective internal controls, and competent personnel. The DoD has robust processes within defense acquisition in the form of its acquisition management framework, requirements, and resourcing processes. The Department also has internal controls provided by the GAO, DoD's Office of Inspector General (DoD IG), congressional oversight, and adherence laws such as annual NDAAs and acquisition Acts like the Nunn–McCurdy Act (Schwartz, 2010). This research helps the DoD to improve the third component of auditability: competent personnel.

As previously discussed, defense acquisition has been criticized for failing to meet cost, schedule, and performance program baseline objectives. In response to the deficiencies in these three areas, the DoD has implemented multiple acquisition reform initiatives to improve its acquisition processes. The reform initiatives have also modified the acquisition reporting structure and used the power of government watchdogs such as the GAO and the DoD IG to implement effective internal controls. To improve the quality of its acquisition professionals, the DoD has made frequent modifications

to the training and education requirements. This literature review covers former acquisition reform initiatives, internal and external findings on DoD acquisition performance, the standards published by the PMI, and scholarly articles that express support and opposition to modifying the alignment of the DoD competencies to the standards of a third party.

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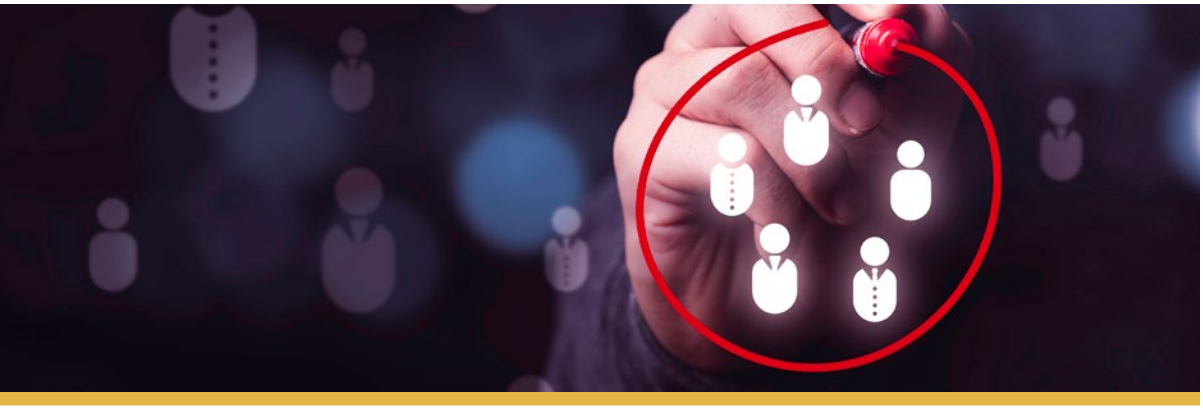
In 1985, the Reagan Administration appointed former U.S. Secretary of Defense David Packard as the head of its Blue Ribbon Commission, which was established to make recommendations on how to improve defense acquisition. The Packard Commission produced nine recommendations; the one recommendation addressed in this research study is to enhance the quality of acquisition personnel (President's Blue Ribbon Commission, 1986). This recommendation focused on improving the appointment criteria of senior-level personnel in order to run programs and portfolios more effectively, and called for business-related education for civilians (President's Blue Ribbon Commission, 1986). This recommendation was finally implemented via the passage of the DAWIA in 1990, which resulted in the development of DAU and the establishment of baseline education and training requirements for acquisition professionals. The DAWIA (1990) also outlined elevated requirements for personnel assigned to critical positions such as program executive officers and senior contracting officials.

DAU is the primary source of training for defense acquisition professionals, providing formal courses as well as continuous learning modules to promote continuing education and professional growth for thousands of students every year (Woolsey, 2019). To date, these courses are structured to accommodate DAWIA certification requirements and are broken down into three levels (DoD & DAU, n.d.):

- **Level I:** basic or entry level
- **Level II:** intermediate or journeyman level
- **Level III:** advanced or senior level. Additional training standards are required for unique positions, including program executive officers and PMs of major defense acquisition programs or major automated information systems.



The content of training requirements for PMs is based on the DoD PM functional career field competencies approved and published by the Office of the Assistant Secretary of Defense. The competencies are further separated into four overarching PM categories, which have served as the basis for developing the learning objectives and training materials for PMs (MacStravic, 2016):

- Acquisition Management
- Business Management
- Technical Management
- Executive Leadership (Level III education for unique positions)

In November 2019, the NDAA directed the Secretary of Defense to implement a certification program based on standards developed by a third party (NDAA, 2019). For the DoD's PM training curriculum, this requires

adjusting the older training standards, which were based solely on DoD-unique functional career field competencies, to align with the "standards developed by a third-party accredited program based on nationally or internationally recognized standards" (NDAA, 2019, p. 778). This shift from DoD-centric competencies to the widely accepted standards of the private sector is an attempt to improve the quality of the Defense Acquisition Workforce by recruiting and growing an experienced and knowledgeable personnel base, thoroughly capable of working with defense industry partners throughout the acquisition process. Further, the purpose of this reform initiative is to change the mindset of PMs as well as to improve the quality of their performance.

As previously discussed, defense acquisition management has been on the GAO's high-risk list since 1990 because of failure to meet the five criteria for removal: leadership commitment, capacity, action plan, monitoring, and demonstrated progress (GAO, 2019b). Of those five, defense acquisition management meets the criteria for leadership commitment but only partially meets the other four. This continued pattern of insufficiency makes the DoD vulnerable to budget overruns, schedule slips, and underperformance—observed in major defense acquisition programs like the F-35 Joint Strike Fighter (GAO, 2018b) and the Army Future Combat Systems (Pernin et al., 2012). The poor returns on investment exhibited by these and other programs have led to the acquisition management career field remaining on the high-risk list (GAO, 2019b) and have created a continual demand for acquisition reform initiatives (Gansler et al., 2007).

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While there is generally consensus among lawmakers and DoD senior leaders that room for improvement certainly exists in how DoD manages programs, the prevailing thought differs on how the DoD should work to improve the acquisition career field. Multiple GAO reports present contradictory views on what needs to change to remove defense acquisition from the high-risk list. Some reports recognize that certification training offered by the DAU is capable of providing adequate training to PMs (GAO, 2010), whereas others state that issues with PMs from the military services emanate from those very same training standards not aligning with leading practices (GAO, 2018a). The takeaway from these two findings is that DAU

has the infrastructure and organizational alignment to provide effective training, but the current training can be more effective if aligned with more widely accepted standards. This issue could be addressed by incorporating the advisement provided by the GAO to the Office of Management and Budget (OMB) by adopting "an existing set of consensus-based standards, such as the widely accepted standards for program and project management from the Project Management Institute" (GAO, 2019a, p. 11).

The PMI is a not-for-profit association that publishes standards for certification programs, including the Project Management Professional (PMP), the Program Management Professional (PgMP), and the Portfolio Management Professional (PfMP). Earning these credentials certifies that one is qualified to lead a project, manage a program, and meet strategic objectives in overseeing one or more portfolios, respectively (PMI, 2020). The PMI certifications are recognized globally due to their widely applicable and highly detailed standards that have proven over time to improve the outcomes of projects, programs, and portfolios if applied and resourced appropriately.

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In 1999, ANSI first approved PMI's *PMBOK Guide* (PMI, 2017a) as the American national standard for project management (Holtzman, 1999). To apply for PMI's PMP credential, candidates must have a high school diploma or associate degree, 5 years of experience in leading projects, and 35 hours of project management education/training. PMP candidates with a 4-year

degree need only 3 years of experience in leading projects (PMI, 2020). This credential is ideal for individuals who lead cross-functional project teams and manage projects, which PMI defines as "temporary endeavors undertaken to create a unique product, service, or result" (PMI, 2017a, p. 4). The PMP credential is broken down into 10 knowledge areas, which are made up of 49 processes. Project management knowledge areas are categorized by their knowledge requirements and are described in terms of their various component processes, practices, inputs, outputs, tools, and techniques (PMI, 2017a). Project management processes are defined as "systematic activities directed toward causing an end result where one or more inputs will be acted upon to create one or more outputs" (PMI, 2017a, p. 18). Figure 1 includes a complete list of the 49 processes that fall under the 10 different knowledge areas in the *PMBOK Guide* (PMI, 2017a).

FIGURE 1. TEN KNOWLEDGE AREAS OF THE *PMBOK GUIDE*

Knowledge Areas	Project Management Process Groups				
	Initiating Process Group	Planning Process Group	Executing Process Group	Monitoring and Controlling Process Group	Closing Process Group
4. Project Integration Management	4.1 Develop Project Charter	4.2 Develop Project Management Plan	4.3 Direct and Manage Project Work 4.4 Manage Project Knowledge	4.5 Monitor and Control Work 4.6 Perform Integrated Change Control	4.7 Close Project or Phase
5. Project Scope Management		5.1 Plan Scope Management 5.2 Collect Requirements 5.3 Define Scope 5.4 Create WBS		5.5 Validate Scope 5.6 Control Scope	
6. Project Schedule Management		6.1 Plan Schedule Management 6.2 Define Management 6.3 Sequence Activities 6.4 Estimate Activity Durations 6.5 Develop Schedule		6.6 Control Schedule	
7.Project Cost Management		7.1 Plan Cost Management 7.2 Estimate Costs 7.3 Determine Budget		7.4 Control Costs	
8. Project Quality Management		8.1 Plan Quality Management	8.2 Manage Quality	8.3 Control Quality	

FIGURE 1. TEN KNOWLEDGE AREAS OF THE *PMBOK GUIDE* (CONTINUED)

Knowledge Areas	Project Management Process Groups				
	Initiating Process Group	Planning Process Group	Executing Process Group	Monitoring and Controlling Process Group	Closing Process Group
9. Project Resource Management		9.1 Plan Resource Management 9.2 Estimate Activity Resources	9.3 Acquire Resources 9.4 Develop Team 9.5 Manage Team	9.6 Control Resources	
10. Project Communications Management		10.1 Plan Communications Management	10.2 Manage Communications	10.3 Monitor Communications	
11. Project Risk Management		11.1 Plan Risk Management 11.2 Identify Risks 11.3 Perform Qualitative Risk Analysis 11.4 Perform Quantitative Risk Analysis 11.5 Plan Risk Responses	11.6 Implement Risk Responses	11.7 Monitor Risks	
12. Project Procurement Management		12.1 Plan Procurement Management	12.2 Conduct Procurements	12.3 Control Procurements	
13. Project Stakeholder Management	13.1 Identify Stakeholders	13.2 Plan Stakeholder Engagement	13.3 Manage Stakeholder Engagement	13.4 Monitor Stakeholder Engagement	

Note. Source: PMI (2017a). WBS = Work Breakdown Structure.

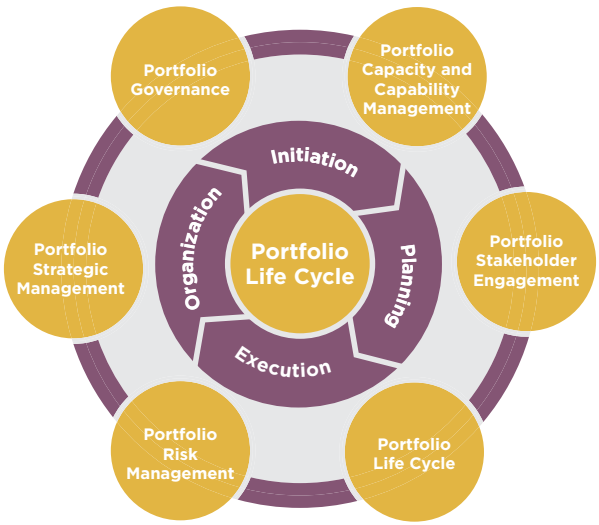
The PgMP certification is based on *The Standard for Program Management* (*TSPgM*) (PMI, 2017c). The purpose of *TSPgM* is to provide generally recognized guidance to support good program management practices, establish a common understanding of the role of a PM, and offer guidance for PMs' interactions with portfolio and project managers as well as any other program stakeholders (PMI, 2017c). According to PMI, a program is made up of "related projects, subsidiary programs, and program activities managed in a coordinated manner" (PMI, 2017c, p. 3). When programs are run effectively, they can deliver benefits that would not have been attainable had their subsidiary programs and projects been managed independently of one another. Similar to the *PMBOK Guide* (PMI, 2017a), *TSPgM* discusses five performance domains that are "complementary groupings of related areas of activity or function that uniquely characterize and differentiate the activities found in one performance domain from the others within the full scope of program management work" (PMI, 2017c, p. 23). The purpose of

these domains is to provide PMs with a general checklist of tasks, analyses, and concepts to complete and consider throughout the life of the program. Figure 2 illustrates these domains.

FIGURE 2. PROGRAM MANAGEMENT PROFESSIONAL PERFORMANCE DOMAINS

Note. Source: PMI (2017c).

FIGURE 3. PORTFOLIO MANAGEMENT PROFESSIONAL PERFORMANCE DOMAINS



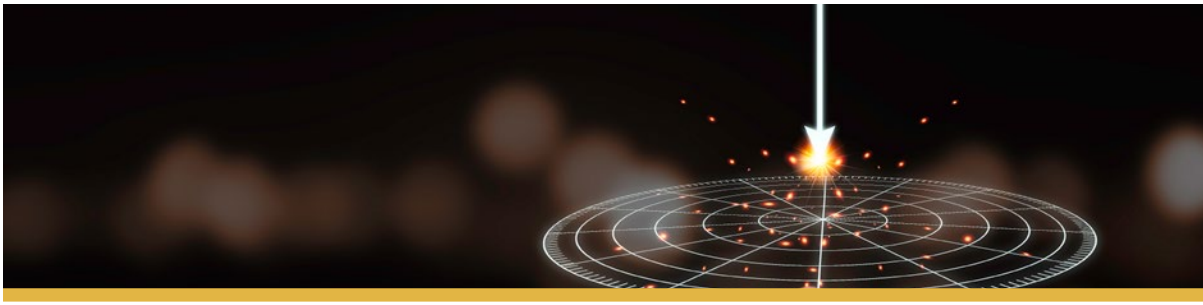
Note. Source: PMI (2017b).

The PfMP certification is based on *The Standard for Portfolio Management* (*TSPfM*) (PMI, 2017b), the purpose of which is to provide portfolio management principles and performance management domains that are considered to be good practices for organizations that manage complex programs and projects. Further, this standard is meant to provide a common understanding of the role of a portfolio manager as well as a unified vocabulary to use across industries (PMI, 2017b). According to PMI, "a portfolio is a collection of projects, programs, and subsidiary portfolios and operations managed as a group to achieve strategic objectives" (PMI, 2017b, p. 3). The purpose of managing a portfolio versus independent programs and projects is to achieve organizational objectives and strategies that could not be met otherwise. *TSPfM* is very similar to *TSPgM* in that it consists of seven performance domains and is supported by the *PMBOK Guide*. These seven performance domains, when followed and executed correctly, are what allow for the portfolio management plan to achieve its desired impact on strategy and performance (PMI, 2017b). For a complete list of these domains and their associated items, see Figure 3.

In the early 2000s, the DoD worked with PMI to develop the *U.S. Department of Defense Extension to: A Guide to the Project Management Body of Knowledge* (*PMBOK Guide*) (DoD & DAU, 2003). The purpose of the DoD and PMI collaboration was to identify defense applications of the *PMBOK Guide*'s knowledge areas and to meet the published objectives of the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics (OUSD[AT&L]). These objectives focused on building credibility in acquisition and logistics support by improving cost estimation techniques and implementing evolutionary acquisition to deliver systems at a lower cost and on schedule (DoD & DAU, 2003). Despite this initiative, the *PMBOK Guide*'s extension was never implemented into the DAU certification curriculum (Kupec, 2013).

> **It is essential to base the new DAWIA certification requirements on all three of the PMI credentials.**

It has been well established that programs in the DoD have struggled for decades to effectively manage program cost, schedule, and performance (GAO, 2018a, 2018b, 2019a). The NDAA (2019) addresses this issue by mandating a modification to existing certification requirements to be based on the standards of an accredited third party with nationally recognized standards. Because of the high visibility and volatility of defense acquisition, many scholarly studies have been published on how the DoD could improve their training standards by mirroring an entity like PMI (Choi, 2009; Kupec,



2013; Redshaw, 2011). In comparison to the progressive complexity of PMI's certifications for project, program, and portfolio management, the DAWIA certifications for Level I (basic), Level II (intermediate), and Level III (advanced) "correlate to the complexity and responsibilities required for designated positions and different types of assignments in weapon systems, services, business management systems and information technology, and international acquisitions" (Redshaw, 2011, p. 55). Both Choi (2009) and Kupec (2013) concur with this analysis and elaborate further that modeling the new DAU standards after only one of the PMI credentialing standards—PMP for example—would not be sufficient. As mentioned above, the individuals who earn the PMP credential have proven themselves capable of effectively leading cross-functional project teams and managing a temporary project. While this credential is beneficial to earn and holds value in the program management industry, the body of knowledge that accompanies it would not be enough to equip an individual to run a complex decade-long program or portfolio. For these reasons, it is essential to base the new DAWIA certification requirements on all three of the PMI credentials.

According to auditability theory, in order for an organization, project team, program office, or portfolio executive officer to meet their specific objectives, it is critical that competent personnel are employed, effective internal controls are maintained, and capable processes are implemented (Rendon & Rendon, 2015). As it relates to defense acquisition reform, auditors have expressed divergent opinions as to which of the three components of auditability should be focused on to improve program metrics in cost, schedule, and performance. For example, Eckerd and Snider (2017) claim that the defense acquisition processes should be the focal point for reform due to their complexities. They add that the environmental politics that DoD PMs maneuver through daily prevent them from being effective, which nullifies any quality training they undergo. Other research comes to a similar conclusion that in order to make significant changes in federal acquisition,

the reform needs to comprehensively consider changes to the management processes (acquisition framework), the resources processes (PPBE system), and the requirements processes (Bond et al., 2016). Mortlock (2020) asserts that providing DoD PMs with professional-level training and adopting internationally recognized industry standards (for example PMP, PgMP, and PfPM certifications) could help improve the effectiveness of PMs. Mortlock also maintains that these actions help gain acceptance for program management as a profession and help solidify the credibility of the defense acquisition workforce.

Methodology

This research involved a qualitative, lexicographic analysis of the descriptions of the DoD's PM competencies and the descriptions of PMI's knowledge areas and domains in the *PMBOK Guide* (PMI, 2017a), *TSPgM* (PMI, 2017c), *TSPfM* (PMI, 2017b), the NDAA for Fiscal Year 2020 (NDAA, 2019), and other key sources. In this analysis, we highlighted key words, phrases, and meaning from the description of each knowledge area, domain, and competency that allowed for an informed mapping of the DoD's PM competencies to PMI's standards.

The OUSD(AT&L) memorandum entitled *Program Management Functional Career Field Competencies* served as the primary DoD source used in analyzing the alignment between the DoD's PM competencies and PMI's standards (MacStravic, 2016). According to the memorandum, an integrated product team developed the updated competencies while considering the three certification levels: Level I (basic), Level II (intermediate), and Level III (advanced) (MacStravic, 2016). The memorandum includes the following information used in this research:

1. Program Management Competency Units and Competencies: The PM competencies are organized into the four program management categories and 18 units of competency. Figure 4 demonstrates the distribution of the competencies.
2. Program Management Functional Career Field Competencies: Descriptions of the 70 competencies are provided for each of the three DAU certification levels. The table data are

organized under the following column headings: unit #, unit of competency, unit of competency description, competency #, competency name, element #, basic competency element description, intermediate competency element, and advanced competency element description. Figures 5 and 6 provide excerpts to visualize the organization of the data.

FIGURE 4. DOD PROGRAM MANAGEMENT COMPETENCY UNITS AND COMPETENCIES

Note. Source: MacStravic (2016).

FIGURE 5. DOD'S PM FUNCTIONAL CAREER FIELD COMPETENCIES TABLE

Unit #	Unit of Competency	Unit of Competency Description	Comp #	Competency Name	Element #
AM1	Capability Integration Planning	Ability to develop both a short- and long-range, innovative acquisition plan/strategy that provides industry with the framework for creating functional activities essential to the development of a technology or system/product and manufacturing and fielding.	1.1	Requirements Management	1.1.1
AM1	Capability Integration Planning	Ability to develop both a short- and long-range, innovative acquisition plan/strategy that provides industry with the framework for creating functional activities essential to the development of a technology or system/product and manufacturing and fielding.	1.1	Requirements Management	1.1.2

Note. Source: MacStravic (2016).

FIGURE 6. DOD'S PM FUNCTIONAL CAREER-FIELD COMPETENCIES TABLE DESCRIPTIONS

Unit #	Basic Competency Element Description	Intermediate Competency Element Description	Advanced Competency Element Description
AM1	Understand that program and portfolio requirements are derived from capability needs statement and Concept of Operations (CONOPS) per the Joint Capabilities Integration and Development System (JCIDS) outputs or functional problem statements (for business systems) to establish the Acquisition Program Baseline (APB).	Derive or assist in deriving feasible program and portfolio requirements from the user capability needs statement and CONOPS per Joint Capabilities Integration and Development System (JCIDS) outputs or functional problem statements (for business systems) to establish the Acquisition Program Baseline (APB).	Derive, or supervise the effort to derive, feasible program and portfolio requirements from the user capability needs statement and CONOPS per Joint Capabilities Integration and Development System (JCIDS) outputs or functional problem statements (for business systems) to establish the Acquisition Program Baseline (APB).
AM1	Understand that there is a process in place that allows the management of the program's requirements baseline, to include interfaces across the program life cycle.	In coordination with the user, utilize a process to create and manage the program requirements baseline, to include interfaces across the program life cycle.	Implement a process, in coordination with the user, to create and manage the program requirements baseline (including interfaces) across the program life cycle.

Note. Source: MacStravic (2016).

The data sources used from PMI include the 6th edition of the *PMBOK Guide*, the 4th edition of *TSPgM*, and the 4th edition of *TSPfM*. Although the *PMBOK Guide* is the only ANSI-accredited standard of the three sources, the contents of *TSPgM* and *TSPfM* are recognized internationally

as commercially accepted industry practices for program and portfolio managers, respectively. *TSPgM* and *TSPfM* define the standards for the application of their principles and practices, which enhances the likelihood of program and portfolio success (PMI, 2017b, 2017c).

The *PMBOK Guide* was developed to simplify and consolidate the vast body of knowledge that makes up the project management profession. It is an evolving standard due to the improving and ever-changing nature of the project management field. The *PMBOK Guide* consists of 10 knowledge areas: project integration management, scope management, schedule management, cost management, quality management, resource management, communications management, risk management, procurement management, and stakeholder management (PMI, 2017a). The 10 knowledge areas, the processes, and the three elements that are applicable across all knowledge areas were used as a source of comparison to the DoD's PM competencies. As an ANSI-approved standard, the *PMBOK Guide* meets the criteria of the NDAA (2019), as it is an accredited third-party program based on nationally recognized standards.

> **Although the *PMBOK Guide* is the only ANSI-accredited standard of the three sources, the contents of *TSPgM* and *TSPfM* are recognized internationally as commercially accepted industry practices for program and portfolio managers, respectively.**

TSPgM was developed to provide "guidance on principles, practices, and activities of program management … [and to] provide a common understanding of the role of a program manager" (PMI, 2017c, p. 2). This standard both complements and aligns with PMI's *PMBOK Guide* (PMI, 2017a) and *TSPfM* (PMI, 2017b). The content of *TSPgM* is broader in scope than the *PMBOK Guide* and consists of five program management performance domains: program strategy alignment, program benefits management, program stakeholder engagement, program governance, and program life cycle management. These performance domains and various elements applicable across all program management domains serve as the source of comparison from *TSPgM* to the DoD's PM competencies. It is crucial to include *TSPgM* in this research because DoD's PMs do not only manage projects—their scope of responsibility ranges from participating on a project team to running large programs and portfolios.

TSPfM (PMI, 2017b) was developed to establish guiding principles for portfolio management practices and activities, and for defining the role of the portfolio manager (Ross & Shaltry, 2006). It was written to align with PMI's *PMBOK Guide* and *TSPgM*. Like *TSPgM*'s relationship to the *PMBOK Guide*, *TSPfM* is broader in scope than other standards. The scope differences are necessary because portfolios require a higher level of oversight than either programs or projects. Portfolios are ongoing ventures and may consist of other portfolios, programs, and projects. On the other hand, programs are made up only of other programs and projects; and projects, smaller still, are temporary and independent endeavors (PMI, 2017a, 2017b, 2017c). Seven portfolio management performance domains make up *TSPfM*: the portfolio life cycle, portfolio strategic management, portfolio governance, portfolio capacity and capability management, portfolio stakeholder engagement, portfolio value management, and portfolio risk management. These performance domains and the elements applicable across all portfolio management domains serve as the source of comparison to the DoD's PM competencies. As previously discussed, it is crucial to include *TSPfM* in this research because of the broad scope of responsibility assigned to DoD PMs.

The structure of the competency alignment map constructed mirrors the organization of the Office of the Assistant Secretary of Defense for Acquisition (OASD[A])'s PM functional career field competencies. The map was constructed in this manner for both ease of organization and for continuity. The headings of the OASD(A)'s table of competencies are shown in Figure 5 and are explained in the following list:

- **Unit #**: This is the coding of the four DoD PM categories (i.e., Acquisition Management [AM], Business Management [BM], Technical Management [TM], and Executive Leadership [EL]) and their successive units of competency. For example, the unit # for Capability Integration Planning is AM1 because it is the first unit of competency that falls under the AM management category.
- **Unit of Competency:** This heading consists of the competency units that make up the four DoD PM categories and is made up of multiple competencies.
- **Competency #**: This is the coding of each DoD PM competency. For example, the Capability Integration Planning competency is broken down into three sub-competencies: 1.1 – Requirements Management, 1.2 – Acquisition Program Strategic Planning, 1.3 – Business Case Development.

- **Competency Name**: This heading consists of the names for all 70 DoD PM competencies (i.e., Requirements Management, Acquisition Program Strategic Planning, Business Case Development, etc.).
- **Element #**: DoD PM competency elements are the lowest level to which the DoD PM competencies are broken down. Each element has a basic, intermediate, and advanced description. The PMI standards were mapped to each of the 190 elements at the basic, intermediate, and advanced level (570 total element descriptions) for a clear picture of the overall alignment. The Element #s are the coding of each element; for example, Element 1.1.1 = descriptor of the Requirements Management competency, which falls under the AM1 PM category and the Capability Integration Planning unit of competency.
- **Basic, Intermediate, and Advanced Competency Element Descriptions**: The three headings contain the descriptions for the basic (DAWIA Level I), intermediate (DAWIA Level II), and advanced (DAWIA Level III) elements.

FIGURE 7. COMPETENCY MAPPING TABLE EXCERPT WITH ADDED HEADINGS FOR BASIC COMPETENCY ELEMENTS

Competency Name	Element #	Basic Competency Element Description	Basic *PMBOK Guide* Equivalent
Requirements Management	1.1.4	Identify a rapid response situation and be aware of the uniquie documents and procedures needed to support urgent warfighter needs.	2.3 Organizational Process Assets 11.2 Identify Risks 11.6 Implement Risk Responses
Requirements Management	1.1.5	Understand how a system of systems architecture influences the decision-making process for requirements while meeting "customer needs."	Requirements Management
Requirements Management	1.1.6	Be aware of the best practices used in trade-off analysis and systems engineering that influence requirements-related program decisions.	2.4 Organizational Systems 5.2 Collect Requirements
Requirements Management	1.1.7	Be aware of the DoD Information Enterprise Architecture and the requirements for adherence to it.	2.2 Enterprise Environmental Factors 2.3 Organizational Process Assets 2.4 Organizational Systems
Acquisition Program Strategic Planning	1.2.1	Be aware of the requirement for an organizational mission, vision of success, and fundamental values as they relate to achieving successful acquisition outcomes.	2.2 Enterprise Environmental Factors 4.1 Develop Project Charter

Note. Adapted from MacStravic (2016). The color coding represents the PMI Standards' alignment with the DoD PM competencies (explained in Table 1).

FIGURE 8. COMPETENCY MAPPING TABLE EXCERPT WITH ADDED HEADINGS FOR INTERMEDIATE COMPETENCY ELEMENTS

Competency Name	Element #	Intermediate Competency Element Description	Intermediate *PMBOK Guide* Equivalent	Intermediate *TSPgM* Equivalent
Requirements Management	1.1.4	Identify and articulate rapid response situations and utilize the uniquie documents and procedures needed to support urgent warfighter needs.	2.3 Organizational Process Assets 4.6 Perform Integrated Change Control 10.2 Manage Communications 11.2 Identify Risks	6.1 Program Governance Practices 7.2 Program Activities and Integration Management 8.2 Program Delivery Phase Activities
Requirements Management	1.1.5	Utilize the requirements process with the user to make decisions in support of a system of systems architecture while meeting "customer needs".	Requirements Management	Requirements Management
Requirements Management	1.1.6	Identify and utilize best practices when conducting trade-off analysis and system engineering when making requirements-related decisions.	2.4 Organizational Systems 5.2 Collect Requirements	2.4 Organizational Systems 5.2 Collect Requirements
Requirements Management	1.1.7	Utilize the DoD Information Enterprise Architecture.	2.2 Enterprise Environmental Factors 2.3 Organizational Process Assets 2.4 Organizational Systems	8.1 Program Definition Phase Activities
Acquisition Program Strategic Planning	1.2.1	Utilize the organization's mission, vision of success, and fundamental values as they relate to achieving successful acquisition outcomes as guiding tools for decisions within a program.	2.2 Enterprise Environmental Factors	3.1 Program Business Case 3.2 Program Charter 6.1 Program Governance Practices

Note. Adapted from MacStravic (2016).

FIGURE 9. COMPETENCY MAPPING TABLE EXCERPT WITH ADDED HEADINGS FOR ADVANCED COMPETENCY ELEMENTS

Competency Name	Element #	Advanced Competency Element Description	Advanced *PMBOK Guide* Equivalent	Advanced *TSPgM* Equivalent	Advanced *TSPfM* Equivalent
Requirements Management	1.1.4	Supervise the identification and articulation of rapid response situations and ensure the use of the uniquie documents and procedures needed to support urgent warfighter needs.	2.3 Organizational Process Assets 4.6 Perform Integrated Change Control 10.2 Manage Communications 11.2 Identify Risks	6.1 Program Governance Practices 7.2 Program Activities and Integration Management 8.2 Program Delivery Phase Activities	2.3 Ongoing Life Cycle 2.4 Portfolio Management Information System 3.3 Portfolio Strategic Objectives 3.7 Portfolio Roadmap
Requirements Management	1.1.5	Guide the requirements process together with the user to meet "customer needs" and support decisions in the context of system of systems architecture.	5.2 Collect Requirements 12.3 Manage Stakeholder Engagement	5. Program Stakeholder Engagement 5.1 Program Stakeholder Identification 5.4 Program Stakeholder Engagement	6. Portfolio Stakeholder Engagement
Requirements Management	1.1.6	Identify and incorporate best practices when conducting trade-off analysis and systems engineering to make requirements-related decisions.	2.4 Organizational Systems 5.2 Collect Requirements	6.1 Program Governance Practices 6.3 Program Governance Design and Implementation	5.4 Capacity Planning 7.5 Negotiating Expected Value
Requirements Management	1.1.7	Ensure the DoD Information Enterprise Architecture is implemented.	2.2 Enterprise Environmental Factors 2.3 Organizational Process Assets 2.4 Organizational Systems	8.1 Program Definition Phase Activities	2.4 Portfolio Management Information System

FIGURE 9. COMPETENCY MAPPING TABLE EXCERPT WITH ADDED HEADINGS FOR ADVANCED COMPETENCY ELEMENTS (CONTINUED)

Competency Name	Element #	Advanced Competency Element Description	Advanced *PMBOK Guide* Equivalent	Advanced *TSPgM* Equivalent	Advanced *TSPfM* Equivalent
Acquisition Program Strategic Planning	1.2.1	Develop and document the organization's mission, vision of success, and fundamental values as they relate to achieving successful acquisition outcomes.	2.2 Enterprise Environmental Factors 4.1 Develop Project Charter	3.1 Program Business Case 3.2 Program Charter 6.1 Program Governance Practices	1.7 Principles of Portfolio Management 1.11 Other Roles in Portfolio Management 3.4 Developing Portfolio Strategic Objectives 3.6 Portfolio Charter

Note. Adapted from MacStravic (2016).

Six columns were added to the OASD(A)'s table of competencies to aid in the mapping process. These six columns and their placement are elaborated below and can be seen in Figures 7–9 to visualize the basic, intermediate, and advanced element mappings.

- **Basic *PMBOK Guide* Equivalent**: This column lists the *PMBOK Guide* knowledge areas that aligned with the DoD PM basic competency elements.
- **Intermediate *PMBOK Guide* Equivalent**: This column lists the *PMBOK Guide* knowledge areas that aligned with the DoD PM intermediate competency elements.
- **Intermediate *TSPgM* Equivalent**: This column lists the *TSPgM* performance domains that aligned with the DoD PM intermediate competency elements.
- **Advanced *PMBOK Guide* Equivalent**: This column lists the *PMBOK Guide* knowledge areas that aligned with the DoD PM advanced competency elements.
- **Advanced *TSPgM* Equivalent**: This column lists the *TSPgM* performance management domains that aligned with the DoD PM advanced competency elements.
- **Advanced *TSPfM* Equivalent**: This column lists the *TSPfM* performance management domains that aligned with the DoD PM advanced competency elements.

This research required the qualitative analysis of data—the data being the DoD's PM competency descriptions and the contents of PMI's knowledge areas and performance management domains, and the qualitative analysis being the alignment mapping. Six qualitative analyses of lexicographic comparisons were performed:

1. DoD's basic (DAWIA Level I) PM competencies to PMI's *PMBOK Guide* knowledge areas and processes
2. DoD's intermediate (DAWIA Level II) PM competencies to PMI's *PMBOK Guide* knowledge areas and processes
3. DoD's intermediate (DAWIA Level II) PM competencies to PMI's *TSPgM* program management domains
4. DoD's advanced (DAWIA Level III) PM competencies to PMI's *PMBOK Guide* knowledge areas and processes
5. DoD's advanced (DAWIA Level III) PM competencies to PMI's *TSPgM* program management domains
6. DoD's advanced (DAWIA Level III) PM competencies to PMI's *TSPfM* portfolio management domains

The purpose of performing these six iterations of comparison was to account for the increasing level of scope for both PMI's program and portfolio management and the DAWIA Level II and III certification requirements.

The sources used in the knowledge review for the DoD's PM competencies included the DoD 5000 series (Office of the Under Secretary of Defense for Acquisition and Sustainment (OUSD[A&S], 2020a, 2020b) and the competency descriptions provided by the OASD(A) (2016). Similarly, in mapping the DoD PM competency equivalents to the PMI's *PMBOK Guide*, *TSPgM*, and *TSPfM*, additional PMI references were leveraged. PMI conference papers served as the primary source for additional information on PMI standards (Alie, 2016; Ross & Shaltry, 2006; Shenhar & Dvir, 2004).

The analysis resulted in the mapping of 1,085 DoD PM competency elements to PMI knowledge areas and domains. The next step in this research applied a quantitative analysis to the completed competency map. For a quantitative analysis, the qualitative data were transformed into a numeric, matrix format (Bernard, 1996). This transition to a matrix format was completed in conjunction with the more qualitative analysis by classifying each element mapping as either aligned, somewhat aligned, completely unaligned, or not applicable. These classifications were determined as follows:

- **Aligned (Green/"G")**: The description of the DoD PM competency element clearly aligned with one or more *PMBOK Guide* knowledge areas or one or more *TSPgM* or *TSPfM* performance domains. Indicators included exact, or synonymous, lexicon and application.
- **Somewhat Aligned (Yellow/"Y")**: The description of the DoD PM competency element was partially aligned with the processes of one or more *PMBOK Guide* knowledge areas or one or more *TSPgM* or *TSPfM* performance domains. Indicators included similar or related lexicon but dissimilar application of the concepts.
- **Completely Unaligned (Red/"RR")**: The description of the DoD PM competency element was not aligned with any of the *PMBOK Guide*'s knowledge areas or *TSPgM* or *TSPfM* performance domains. The only indicator was the absence of similar content and descriptors.
- **Not Applicable (Black/"N/A")**: Certain DoD PM competency elements were designated as not applicable at the basic and intermediate level because they only apply at the intermediate or advanced level of DoD program management.

A color-coding system was applied to this mapping process to signify the degree of alignment for each element mapping (green = aligned; yellow = somewhat aligned; red = completely unaligned; see Table 1). Green classifications were coded as "G"; yellow classifications were coded as "Y"; red classifications were coded as "RR"; black classifications were defined as "N/A." This coding system allowed the use of Microsoft Excel's = COUNTIF function to rapidly calculate the number of instances that DoD PM competency elements were aligned, somewhat aligned, completely unaligned, or not applicable with PMI's *PMBOK Guide*, *TSPgM*, and *TSPfM*.

The next step in the analysis codified the PMI standards' knowledge areas and performance domains annotated in the element mapping as instances of alignment (see Tables 2–4). Several of the mapped elements aligned with multiple knowledge areas and performance management domains.

TABLE 1. CLASSIFYING AND CODIFYING ALIGNMENT

Classification	Code	DoD PM Competency Elements' Relationship with PMI	Indicators
Aligned	G	Clearly Aligned	Exact / Comparable Verbiage & Application
Somewhat Aligned	Y	Partially Aligned, or Interpreted as Such	Similar Verbiage / Dissimilar Application
Completely Unaligned	RR	Not Aligned	No Similarities
Not Applicable	N/A	Not Aligned	

TABLE 2. CODIFIED LABELING OF *PMBOK GUIDE* KNOWLEDGE AREAS

Knowledge Areas	Coded Label	Classifications
Introduction The Environment in Which Projects Operate The Role of the Project Manager	1 2 3	Elements Across All Knowledge Areas
Project Integration Management	4	Knowledge Area
Project Scope Management	5	Knowledge Area
Project Schedule Management	6	Knowledge Area
Project Cost Management	7	Knowledge Area
Project Quality Management	8	Knowledge Area
Project Resource Management	9	Knowledge Area
Project Communications Management	10	Knowledge Area
Project Risk Management	11	Knowledge Area
Project Procurement Management	12	Knowledge Area
Project Stakeholder Management	13	Knowledge Area

Note. Adapted from PMI (2017a).

TABLE 3. CODIFIED LABELING OF *TSPGM* PERFORMANCE DOMAINS

Knowledge Areas	Coded Label	Classifications
Introduction Program Management Performance Domains Program Activities	1 2 8	Elements Across All Domains
Program Strategy Alignment	3	Domain
Program Benefits Management	4	Domain
Program Stakeholder Engagement	5	Domain
Program Governance	6	Domain
Program Life Cycle Management	7	Domain

Note. Adapted from PMI (2017c).

TABLE 4. CODIFIED LABELING OF *TSPFM* PERFORMANCE DOMAINS

Knowledge Areas	Coded Label	Classifications
Introduction	1	Elements Across All Domains
The Portfolio Life Cycle	2	Domain
Portfolio Strategic Management	3	Domain
Portfolio Governance	4	Domain
Portfolio Capacity and Capability	5	Domain
Portfolio Stakeholder Engagement	6	Domain
Portfolio Value Management	7	Domain
Portfolio Risk Management	8	Domain

Note. Adapted from PMI (2017b).

FIGURE 10. EXCERPT OF COMPETENCY MAP WITH CODIFIED ALIGNMENT AND KNOWLEDGE AREAS FOR BASIC ELEMENTS 3.3.3–3.4.2

Unit of Competency	Comp #	Competency Name	Element #	Basic Competency Element Description	KA	KA	KA	Alignment Code	Basic *PMBOK Guide* Equivalent
Program Execution	3.3	Teaming	3.3.3	Develop a basic understanding of how contractors develop and implement strategies for priming, subcontracting and teaming and how those strategies reflect a variety of desired outcomes.	12			Y	12.1 Plan Procurement Management
Program Execution	3.3	Teaming	3.3.4	Understand that there are internal and external customers and stakeholders with needs.	13			G	13.1 Identify Stakeholders 13.2 Plan Stakeholder Management
Program Execution	3.4	Program Oversight	3.4.1	Understand that program reviews and assessments evaluate the cost, schedule, and performance of the program.	6	7	8	G	6.6 Control Schedule 7.4 Control Costs 8.1 Plan Quality Management 8.2 Manage Quality Management 8.3 Control Quality
Program Execution	3.4	Program Oversight	3.4.2	Understand that the program is required to conduct technical assessments of prime and subcontractors.	8	11	12	Y	8.1 Plan Quality Management 11.1 Plan Risk Management 12.3 Plan Procurement Management

Note. Adapted from MacStravic (2016). KA = Knowledge Area. There are multiple rows because each DoD PM element may be covered by multiple knowledge areas.

After alignment of the DoD PM competencies to PMI knowledge areas and performance domains, the data were organized to ease interpretation. Six Microsoft Excel sheets were developed: one for every comparison made between the DoD PM competencies and PMI knowledge areas/domains (as shown in Figure 10). Each sheet tabulated the number of instances that PMI knowledge areas and domains mapped to each DoD PM unit of competency element; those mappings were then broken down into the different alignment categories. For example, the *PMBOK Guide* knowledge area Project Integration Management aligned with 24 of the DoD PM basic units of competency elements, somewhat aligned with 9, and was unaligned with 10.

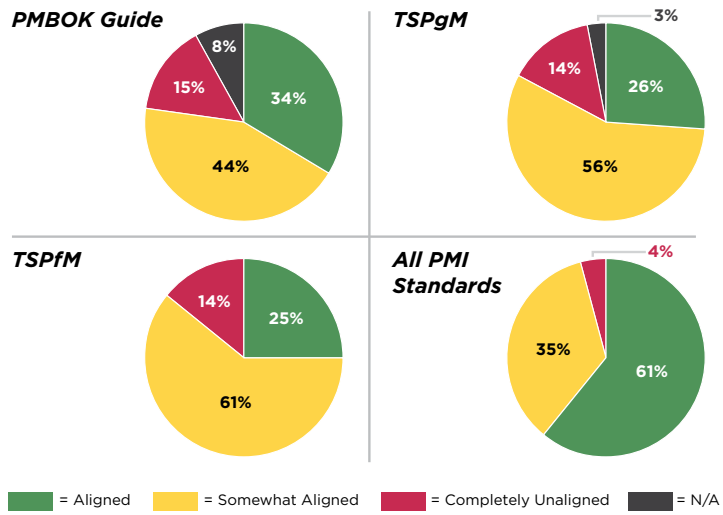
Data Analysis

This section addresses the extent to which the DoD's 2016 PM functional career field competencies are aligned with PMI's *PMBOK Guide*, *TSPgM*, and *TSPfM*. The first step taken in the analysis was to count how many DoD competency elements were mapped to PMI's *PMBOK Guide*, *TSPgM*, and *TSPfM* and were classified as *aligned, somewhat aligned, completely unaligned,* or *N/A* (refer to Table 5). Categories were created for the *PMBOK Guide*, *TSPgM*, and *TSPfM* by combining the basic, intermediate, and advanced elements that mapped to each standard. A fourth category was included that combined the findings across all three PMI standards to demonstrate the extent of alignment between the DoD PM competencies and the PMI standards when all PMI standards were applied. For example, if a single element was labeled as aligned under the *PMBOK Guide* but completely unaligned under *TSPgM* and *TSPfM*, it would be classified as aligned under the All PMI category. This method demonstrates the value of applying all three PMI standards in DoD PM training instead of the *PMBOK Guide* only. Finally, a fifth category was applied that shows the number of elements categorized as 100% aligned, somewhat aligned, or completely unaligned with the *PMBOK Guide*, *TSPgM*, and *TSPfM*. This category is significant because it shows that when all three PMI standards are applied, only eight of 190 DoD PM competency elements are completely unaligned with the PMI standards. According to the research, the DoD PM competencies align with the *PMBOK Guide*, *TSPgM*, and *TSPfM* as depicted in Figure 11.

TABLE 5. QUANTITY OF DOD PM COMPETENCY ELEMENTS MAPPED TO PMI'S STANDARDS (ORGANIZED BY LEVEL OF ALIGNMENT AND DAWIA LEVEL)

	Basic *PMBOK Guide*	Intermediate *PMBOK Guide*	Intermediate *TSPgM*	Advanced *PMBOK Guide*	Intermediate *TSPgM*	Advanced *TSPfM*
Aligned	73	65	52	56	47	47
Somewhat Aligned	66	83	98	99	115	116
Completely Unaligned	20	29	27	35	28	27
Not Applicable	31	13	13	0	0	0
	190	190	190	190	190	190

FIGURE 11. EXTENT TO WHICH THE DOD PM COMPETENCY ELEMENTS ALIGN TO THE PMI STANDARDS BY PIE CHART



Based on these findings, clearly, the *PMBOK Guide* is the PMI standard that is most aligned with the DoD PM competency elements. This is expected, as the *PMBOK Guide* serves as the building block for *TSPgM* and *TSPfM* and is the broadest of the three standards. However, by adding *TSPgM* and *TSPfM* standards to the standards of the *PMBOK Guide*, the alignment level of the PMI standards with the DoD PM competencies increases to 96% (61% completely aligned and 35% somewhat aligned). Further, the percentage of elements that are categorized as completely unaligned or not applicable decreased to 4% and 0%, respectively.

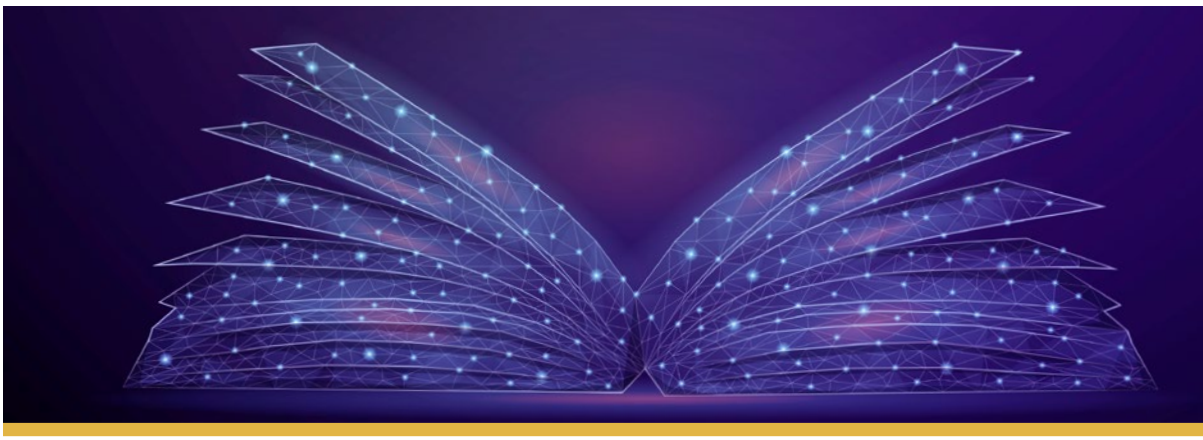


FIGURE 12. ALIGNMENT OF ACQUISITION MANAGEMENT DOD PM CATEGORY BY PMI

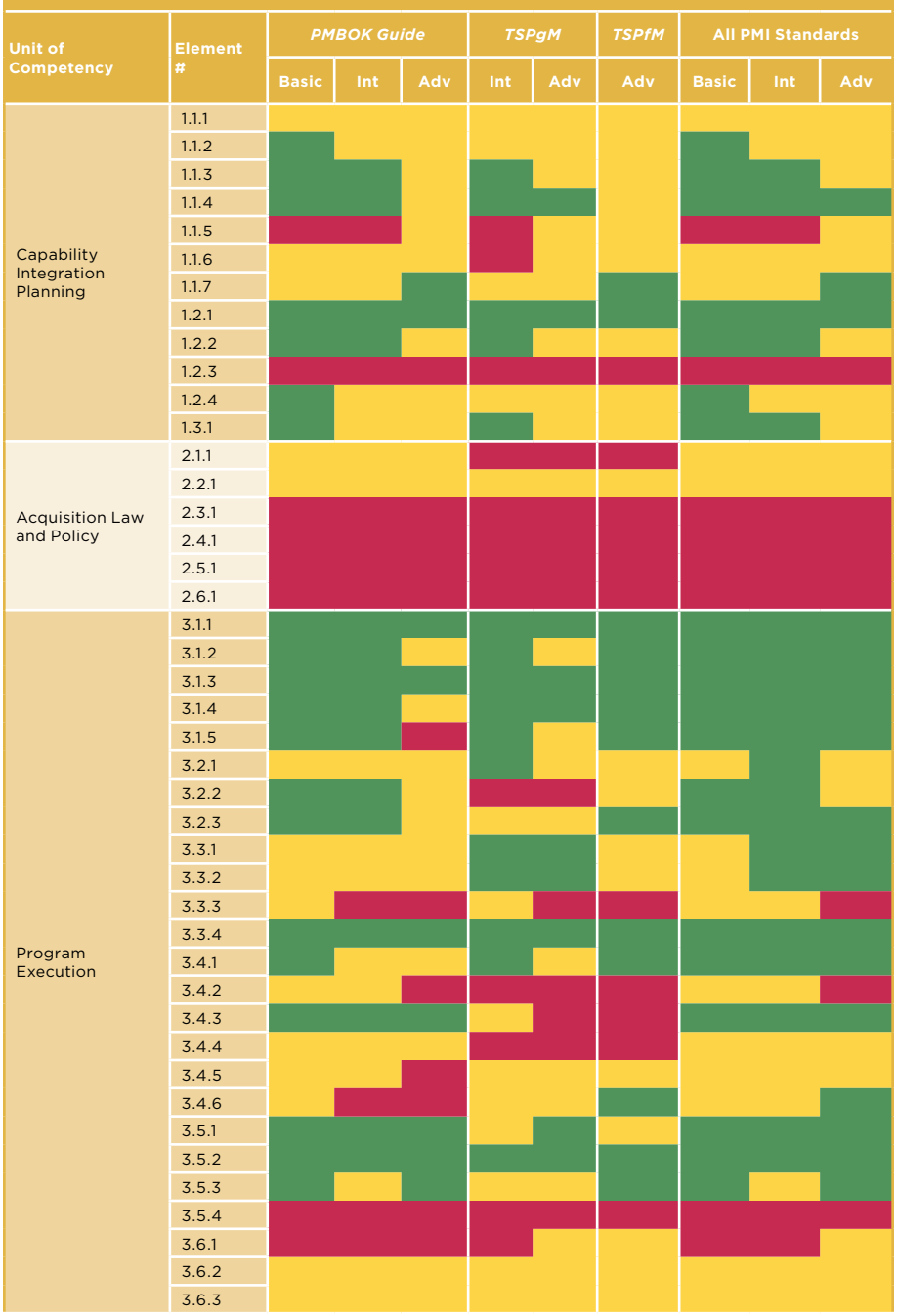


FIGURE 12. ALIGNMENT OF ACQUISITION MANAGEMENT DOD PM CATEGORY BY PMI (CONTINUED)

Unit of Competency	Element #	*PMBOK Guide*			*TSPgM*		*TSPfM*	All PMI Standards		
		Basic	Int	Adv	Int	Adv	Adv	Basic	Int	Adv
Stakeholder Management	4.1.1									
	4.2.1									
	4.3.1									
International Acquisition and Exportability (IA&E)	5.1.1									
	5.1.2									
	5.2.1									
	5.2.2									
	5.3.1									
	5.3.2									
	5.3.3									
	5.4.1									
	5.4.2									
Services Acquisition	6.1.1									
	6.1.1									
	6.1.1									

FIGURE 13. ALIGNMENT OF BUSINESS MANAGEMENT DOD PM CATEGORY BY PMI STANDARD

Unit of Competency	Element #	*PMBOK Guide*			*TSPgM*		*TSPfM*	All PMI Standards		
		Basic	Int	Adv	Int	Adv	Adv	Basic	Int	Adv
Contract Management	1.1.1									
	1.1.2									
	1.1.3									
	1.1.4									
	1.2.1									
	1.2.2									
	1.2.3									
	1.2.4									
	1.2.5									
	1.2.6									
	1.2.7									
	1.2.8									
	1.2.9									
	1.2.10									
	1.2.11									
	1.3.1									
	1.3.2									
	1.4.1									
	1.4.2									
	1.4.3									
	1.4.4									
	1.4.5									
	1.4.6									
	1.4.7									
	1.5.1									
Financial Management	2.1.1									
	2.2.1									
	2.3.1									
	2.3.2									
	2.3.3									
	2.4.1									
	2.4.2									
	2.4.3									
	2.4.4									
	2.5.1									
	2.5.2									

FIGURE 14. ALIGNMENT OF TECHNICAL MANAGEMENT DOD PM CATEGORY BY PMI STANDARD

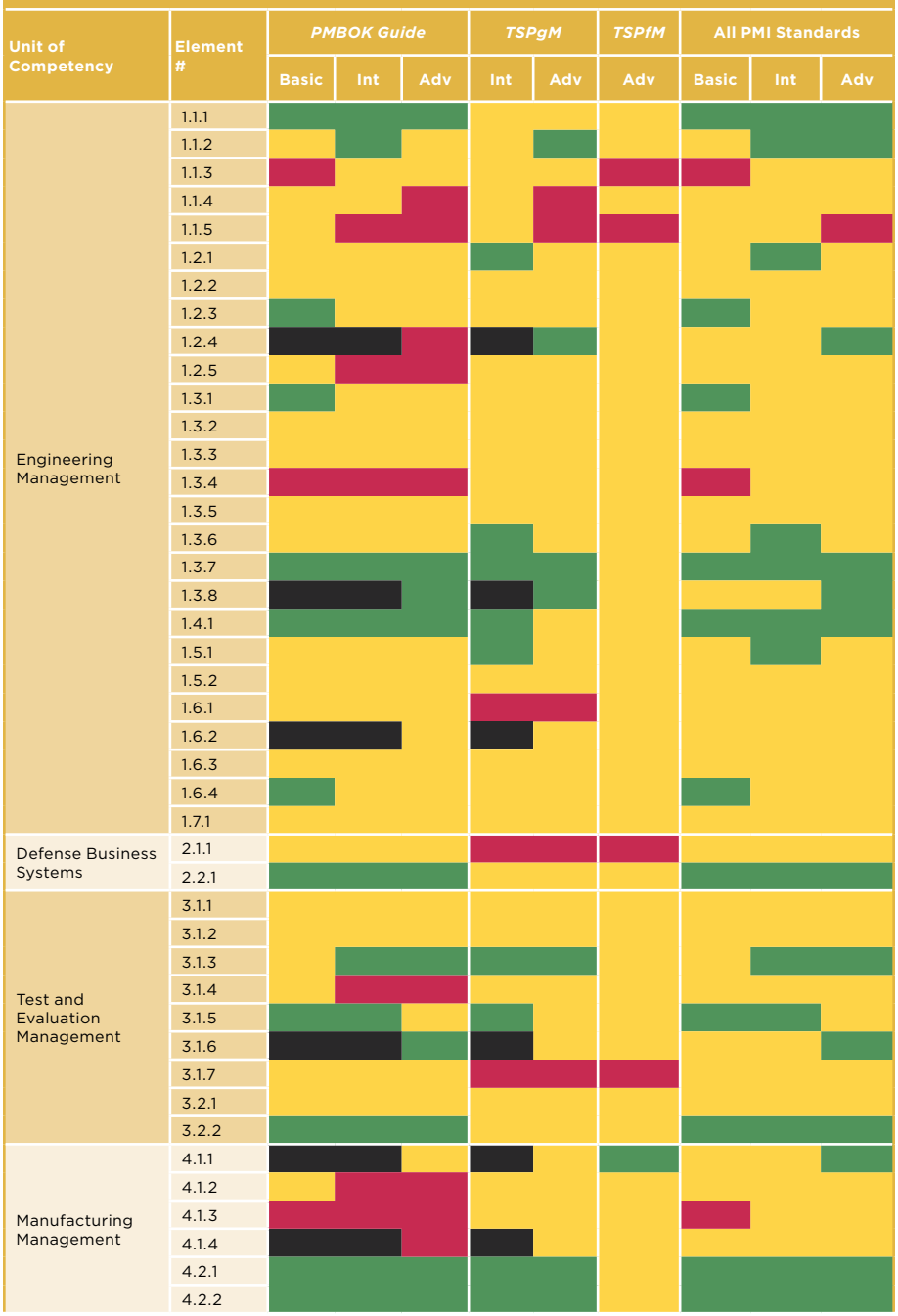


FIGURE 14. ALIGNMENT OF TECHNICAL MANAGEMENT DOD PM CATEGORY BY PMI STANDARD (CONTINUED)

Unit of Competency	Element #	*PMBOK Guide*			*TSPgM*		*TSPfM*	All PMI Standards		
		Basic	Int	Adv	Int	Adv	Adv	Basic	Int	Adv
Product Support Management	5.1.1									
	5.1.2									
	5.2.1									
	5.2.2									
	5.2.3									
	5.2.4									
	5.2.5									
	5.2.6									
	5.3.1									
	5.3.2									
	5.3.3									

FIGURE 15. ALIGNMENT OF EXECUTIVE LEADERSHIP DOD PM CATEGORY BY PMI STANDARD

Unit of Competency	Element #	*PMBOK Guide*			*TSPgM*		*TSPfM*	All PMI Standards		
		Basic	Int	Adv	Int	Adv	Adv	Basic	Int	Adv
Foundational Competencies	1.1.1									
	1.1.2									
	1.2.1									
	1.3.1									
	1.3.2									
	1.3.3									
	1.4.1									
	1.4.2									
	1.4.3									
	1.5.1									
	1.6.1									
	1.6.2									
Leading Change	2.1.1									
	2.1.2									
	2.2.1									
	2.3.1									
	2.3.2									
	2.4.1									
	2.4.2									
Leading People	3.1.1									
	3.2.1									
	3.2.2									
	3.3.1									
	3.4.1									

FIGURE 15. ALIGNMENT OF EXECUTIVE LEADERSHIP DOD PM CATEGORY BY PMI STANDARD

Unit of Competency	Element #	*PMBOK Guide*			*TSPgM*		*TSPfM*	All PMI Standards		
		Basic	Int	Adv	Int	Adv	Adv	Basic	Int	Adv
Results-Driven	4.1.1									
	4.1.2									
	4.2.1									
	4.2.2									
	4.2.3									
	4.3.1									
	4.3.2									
	4.3.3									
	4.3.4									
	4.4.1									
	4.5.1									
	4.5.2									
	4.5.3									
Building Coalitions	5.1.1									
	5.1.2									
	5.1.3									
	5.2.1									
	5.2.2									

Figures 12–15 further elaborate on the impact achieved when applying all three PMI standards to DoD PM competencies in order to provide sufficient detail in determining which DoD PM competency elements need to be improved to ensure sufficient alignment with the PMI standards. These figures provide a visualization of the progressive improvement in alignment as all three PMI standards are applied. Figures 12–15 also demonstrate the different levels of alignment within the Acquisition Management, Business Management, Technical Management, and Executive Leadership DoD PM categories, respectively.

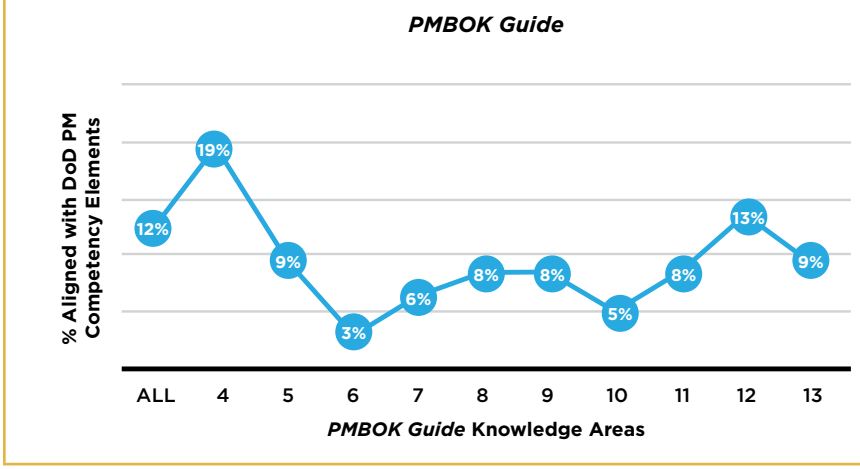
The visualizations in these figures demonstrate the alignment improvement of incorporating all three PMI standards to the DoD PM categories. By circumstance, the visualizations also provide a clear view of which DoD PM category is least aligned with the PMI standards. The Acquisition Management DoD PM category from Figure 12 contains the two DoD PM units of competency that are the least aligned across all three PMI standards. They include Acquisition Law and Policy (0% aligned, 33% somewhat aligned, and 67% completely unaligned) and the International Acquisition and Exportability (0% aligned, 74% somewhat aligned, and 26% completely unaligned) units of competency. This does not come as a surprise since these two units of competency are mostly exclusive to the DoD's nature of work and would not contain lexicon that would be commonplace in an

industry-wide standard. Therefore, courses in these two units of competency would need to augment acquisition/PM training if the DoD adopted PMI certification standards.

This section provides a breakdown of the competency mapping by the *PMBOK Guide* project management knowledge areas, *TSPgM* program management performance domains, and *TSPfM* portfolio management performance domains to answer the question, *What PMI knowledge areas and performance domains are most aligned and least aligned with the DoD program management functional career field competency elements?* Analyzing the level of alignment between the DoD's PM functional career field competencies and the PMI standards at this level enables DoD officials to see which knowledge areas and domains are not being applied in the DoD's PM competencies.

This analysis required the approach of mapping the DoD's PM competency elements to the PMI knowledge areas and performance domains by determining the DoD PM competency elements that aligned (both completely and somewhat) with the PMI's knowledge areas and performance domains. This process enabled the tallying of each knowledge area and performance domain that aligned with the DoD PM competency elements. Figure 16 demonstrates the extent to which each of the *PMBOK Guide*'s 10 knowledge areas align with the DoD PM competency elements. This analysis enables DoD stakeholders such as DAU to adjust training and learning objectives to appropriately integrate the *PMBOK Guide* project management knowledge areas into PM certification curriculum.

FIGURE 16. ALIGNMENT OF THE *PMBOK GUIDE* PROJECT MANAGEMENT KNOWLEDGE AREAS TO DOD COMPETENCY ELEMENTS



The knowledge areas that exhibited the greatest level of alignment were 4 – Project Integration Management, 12 – Project Procurement Management, and All – Elements Across All Knowledge Areas.

- **4 – Project Integration Management**: This knowledge area made up 19% of all the aligned and somewhat aligned DoD PM competency elements—more than any other section. Project Integration Management includes the coordination of all processes that spread across every *PMBOK Guide* process group (initiating, planning, executing, monitoring and controlling, and closing) and thus unify a project/program's life cycle.
- **12 – Project Procurement Management**: This knowledge area made up 13% of all the aligned and somewhat aligned elements. Due to the high quantity of services and acquisition within the DoD that rely on contract management, this knowledge area could be considered critical to include in the training of DoD PMs. It should be noted that while this was the second most aligned knowledge area, it also mapped most to the Contract Management DoD PM unit of competency, which falls under the second most completely unaligned DoD PM category, Business Management.
- **All – Elements Across All Knowledge Areas**: This pseudo–knowledge area consists of *PMBOK Guide* Sections 1 – Introduction, 2 – The Environment in Which Projects Operate, and 3 – The Role of the Project Manager. While these sections are not *PMBOK Guide* project management knowledge areas, they contain a great deal of information regarding project management and should not be ignored in updating or developing new DoD PM standards. This section demonstrated 12% alignment with the basic, intermediate, and advanced elements of the DoD PM competencies.

> **"This analysis enables DoD stakeholders such as DAU to adjust training and learning objectives to appropriately integrate the *PMBOK Guide* project management knowledge areas into PM certification curriculum.**

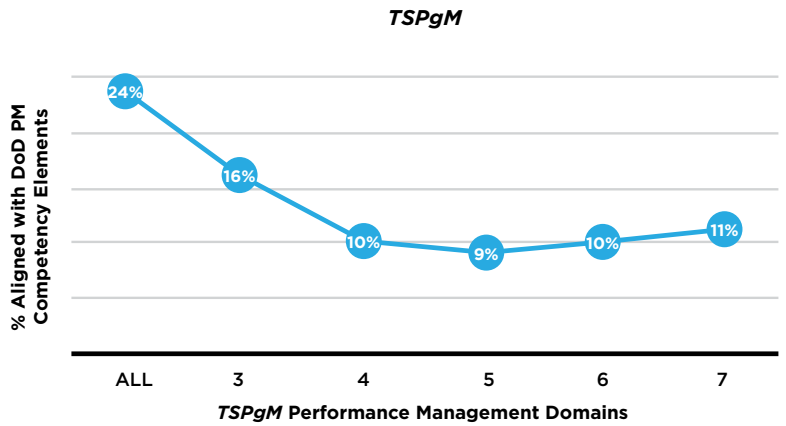
The knowledge areas that exhibited the lowest level of alignment were 6 – Project Schedule Management, 10 – Project Communications Management, and 7 – Project Cost Management.

- **6 – Project Schedule Management**: This knowledge area made up only 3% of the aligned and somewhat aligned DoD PM competency elements. This deficiency in alignment is concerning because managing schedule is one of the three project management tenets that make up the triple constraint of project management (Atkinson, 1999). The other two components of the triple constraint are cost management and scope/performance management. The concept behind the triple constraint is that if one of the three (cost, schedule, or scope/performance) changes, one or both of the other two will be impacted. Understanding how to manage the triple constraint is critical for project managers and PMs, for if the three components are not well planned, executed, monitored, or controlled, then the project's or program's acquisition baselines will be difficult to set and manage, jeopardizing the success of the project or program.
- **7 – Project Cost Management**: This knowledge area made up 6% of the aligned and somewhat aligned DoD PM competency elements. As stated, cost management is one of the three components of the triple constraint and is therefore critical in project management.
- **10 – Project Communications Management**: This knowledge area made up only 5% of the aligned and somewhat aligned DoD PM competency elements. The impact that communications management can have on a project cannot be overstated. Mortlock (2016) opined that including some form of communications document (e.g., a strategic communication [STRATCOM] plan) that conveys a project's or program's desired impact and synchronizes its implementation and execution plans has proven valuable to program success.

“Understanding how to manage the triple constraint is critical for project managers and PMs, for if the three components are not well planned, executed, monitored, or controlled, then the project's or program's acquisition baselines will be difficult to set and manage, jeopardizing the success of the project or program.

To summarize, the least aligned *PMBOK Guide* knowledge areas were project cost, schedule, and communications management. Two of these three are related to the triple constraint, which—if not professionally managed—can significantly impact project outcomes. The fact that the DoD PM competencies do not align well with these *PMBOK Guide* sections may be cause for concern because it is an indicator that the DoD is not adequately training their PMs on the importance of managing schedule, cost, and communications—at least in the realm of formal acquisition training.

FIGURE 17. ALIGNMENT OF *TSPgM* PROGRAM MANAGEMENT PERFORMANCE DOMAINS TO INTERMEDIATE AND ADVANCED DOD COMPETENCY ELEMENTS



This section demonstrates the extent to which each of *TSPgM*'s program management performance domains—and elements across all domains—align with the intermediate and advanced DoD PM competency elements (see Figure 17). This analysis enables DoD stakeholders to focus on the most relevant *TSPgM* program management performance domains when restructuring their certification curriculum.

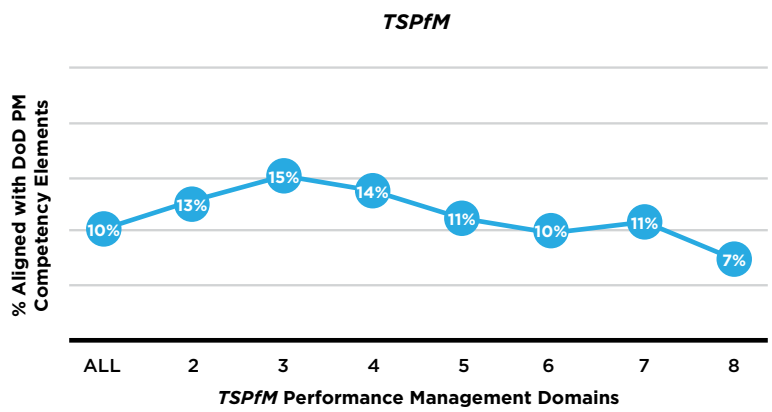
The program management performance domains that exhibited the greatest level of alignment include All – Elements Across All Knowledge Areas and 3 – Program Strategy Alignment. The remaining four performance domains exhibited mostly similar levels of alignment (9%–11%).

- **All – Elements Across All Program Management Performance Domains**: This pseudo domain consists of *TSPgM* Sections 1 – Introduction, 2 – Program Management Performance Domains, and 8 – Program Activities. While these sections are not *TSPgM* program management performance

domains, they contain a great deal of information regarding program management and should not be ignored in updating or developing new DoD PM standards. This section makes up 24% of the DoD PM elements that were categorized as aligned or somewhat aligned.

- **3 – Program Strategy Alignment**: The contents of this performance domain identify "program outputs and outcomes to provide benefits aligned with the organization's strategic goals and objectives" (PMI, 2017c, p. 33). It is a good thing that the DoD PM competencies emphasize this performance domain because of the high number of portfolios and programs managed by the DoD. Providing training on organizational strategy and benefits management enables DoD PMs, portfolio managers, and other DoD acquisition leaders to effectively develop, align, and manage agency-wide acquisition and capability objectives.

FIGURE 18. ALIGNMENT OF *TSPfM* PORTFOLIO MANAGEMENT PERFORMANCE DOMAINS TO ADVANCED DOD COMPETENCY ELEMENTS



This section demonstrates the extent to which each of *TSPfM*'s portfolio management performance domains—and elements across all domains—align with the advanced DoD PM competency elements (see Figure 18). This analysis enables DoD stakeholders to focus on the most relevant *TSPfM* program management performance domains when restructuring their certification curriculum.

The portfolio management performance domains that exhibited the greatest level of alignment were 2 – The Portfolio Life Cycle, 3 – Program Strategic Management, and 4 – Portfolio Governance.

- **2 – The Portfolio Life Cycle**: Just as the *PMBOK Guide* Project Integration Management knowledge area was highly aligned with the DoD PM competencies, so too is this performance domain (13%). These two are comparable due to their ongoing nature. Project Integration Management and Portfolio Life Cycle Management heavily rely on information systems that enable effective communication and support seamless and timely transitions between project and life cycle phases (PMI, 2017a, 2017b). Due to the criticality of this performance domain, the DoD should continue to promote this as a highly aligned domain.
- **3 – Portfolio Strategic Management**: This performance domain makes up 15% of the aligned DoD PM competencies. Decisions relying on strategic alignment are made at the executive level.
- **4 – Portfolio Governance**: This performance domain makes up 14% of the aligned DoD PM competency elements. The effective implementation of Portfolio Governance aids an organization in becoming auditable (Rendon & Rendon, 2015). Implementing this domain into DoD PM training will offer guidance on ensuring portfolio oversight, effective reporting structures, and stakeholder management.

“Project Integration Management and Portfolio Life Cycle Management heavily rely on information systems that enable effective communication and support seamless and timely transitions between project and life cycle phases.

The performance domain that exhibited the lowest level of alignment was 8 – Portfolio Risk Management.

- **8 – Portfolio Risk Management**: This domain made up the lowest number of aligned DoD PM elements. This indicates that the current DoD PM competency elements do not include many elements related to risk management at the advanced level. The DoD should consider addressing this training gap to improve its PMs’ ability to identify, analyze, and manage risks at the portfolio level. By successfully identifying and analyzing risks, the DoD will be able to develop more accurate cost and schedule management plans and estimates. This should lead

to fewer cost overruns and schedule slips, and empower DoD PMs to develop more successful acquisition strategies that account for risks.

Conclusions

This research provided the DoD with information and insight necessary to respond effectively to the Fiscal Year 2020 NDAA's (2019) mandate to base acquisition workforce certification requirements on nationally or internationally recognized third-party standards. The goal of the NDAA's mandate is to improve the quality of the DoD's program management workforce through effective training. As globally recognized standards, PMI's *PMBOK Guide*, *TSPgM*, and *TSPfM* serve as excellent foundations on which to base the DoD's program management certification requirements. The researchers investigated the degree to which the DoD's PM competencies align with the standards of the PMI's *PMBOK Guide*, *TSPgM*, and *TSPfM*. Analyzing and defining the level of alignment between the two standards enables training organizations to provide the acquisition workforce with more comprehensive training that leverages internationally recognized PM standards.

From a high-level perspective, the *PMBOK Guide* proved to be the most aligned, *TSPgM* is the second most aligned, and *TSPfM* is the least aligned with DoD PM competencies (refer to Table 6). The knowledge areas and performance domains that were most aligned with the DoD's PM competency elements included concepts for strategic management, life cycle management, and overarching concepts as indicated by the "Elements Across all Knowledge Areas/Performance Domains" identifier. The most concerning finding from this research was the discovery of the relatively low level of alignment of the schedule and cost management knowledge areas across DoD PM competencies.

TABLE 6. SUMMARY RESEARCH FINDINGS

1. To what extent are the DoD's 2016 program management competency elements aligned with the PMI's *PMBOK Guide*, *TSPgM*, and *TSPfM*? Which PMI standard is most aligned?			
PMBOK Guide	***TSPgM***	***TSPfM***	**All PMI Standards**
34% Aligned (Most Aligned)	26% Aligned	25% Aligned	61% Aligned

2. What PMI knowledge areas and performance domains are most and least aligned with the DoD program management functional career field competency elements?	
***PMBOK Guide* Knowledge Areas**	
Most Aligned	**Least Aligned**
All - Elements Across All Knowledge Areas	6 - Project Schedule Management
4 - Project Integration Management	7 - Project Cost Management
13 - Project Stakeholder Management	10 - Project Communications Management
***TSPgM* Performance Domains**	
Most Aligned	**Least Aligned**
All - Elements Across All Performance Domains	N/A
3 - Program Strategy Alignment	
***TSPfM* Performance Domains**	
Most Aligned	**Least Aligned**
2 - The Portfolio Life Cycle	8 - Portfolio Risk Management
3 - Portfolio Strategic Management	4 - Portfolio Governance
4 - Portfolio Governance	

The following are recommendations based on analyses conducted throughout this research.

1. Base the new DAWIA PM training certification requirements on the *PMBOK Guide*, *TSPgM*, and *TSPfM*.

A review of the literature and the analysis of the mappings between the DoD's PM functional career field competencies and the PMI standards have led the researchers to believe that the DoD should base their new certification requirements on all three PMI standards. As discussed in the literature review, the progressive complexity and scope of the DAWIA certifications "correlate to the complexity and responsibilities required for designated

positions and different types of assignments in weapon systems, services, business management systems and information technology, and international acquisitions" (Redshaw, 2011, p. 55). Because the *PMBOK Guide* is exclusively aimed towards individuals charged with managing temporary endeavors (projects), it would not suffice as the sole source of training for the DoD's program management workforce. For example, many PMs run programs that have existed for decades and manage portfolios that contain a multitude of different projects and programs. Such endeavors require a higher level managerial perspective and scope of control than the *PMBOK Guide* provides. Therefore, the *PMBOK Guide* would not be able to meet the progressive complexities of the DAWIA certifications and operational responsibilities that are reflected in the DoD's acquisition workforce. By adding *TSPgM* and *TSPfM* to the certification framework of their PMs, the DoD can account for the increase in managerial scope that PMs will see as they progress in their careers.

2. Maintain the three-tiered certification model.

The DAWIA three-tiered certification model consists of Level I (basic), Level II (intermediate), and Level III (advanced). This progressive education model enables PMs to be trained on relevant subject matter and prevents them from learning out-of-scope material too early. For example, it would not make sense for a DoD project manager to be trained on portfolio life-cycle management when the scope of their responsibilities is to manage small projects at the base level. Further, it would be a disservice to the DoD if program executive officers, who primarily manage portfolios, were not trained on basic project management practices, because those practices form the basis of portfolio governance and strategic alignment across projects, programs, and portfolios. To guide PMs from an introduction to project management to being capable of running vast programs and portfolios, the DoD must establish a training program that gradually increases in scope

in correlation with the scope of the PM's current job responsibilities. This can be accomplished by establishing certification standards based on the following model:

- DAWIA Level I (basic/project managers) – *PMBOK Guide*
- DAWIA Level II (intermediate/PMs) – *TSPgM*
- DAWIA Level III (advanced/program and portfolio managers) – *TSPfM*

This would allow for a gradual increase in program management knowledge and application and align experience to training certifications. To improve upon this model, the DoD should enable cross-sectioning of the three PMI standards into each certification level. As mentioned, the *PMBOK Guide* serves as the foundation for both *TSPgM* and *TSPfM* and therefore holds valuable information that should be used in the training of managers of programs and portfolios. Likewise, including sections of *TSPgM* and *TSPfM* with the Level I education allows young DoD PMs to see the larger picture of their career and can help them to better understand the intricacies of the basic project management training.

> **"To guide PMs from an introduction to project management to being capable of running vast programs and portfolios, the DoD must establish a training program that gradually increases in scope in correlation with the scope of the PM's current job responsibilities.**

3. Augment professional certifications with DoD-specific PM training.

As this research has demonstrated, the three PMI standards alone do not cover all the DoD PM competencies. For example, if the PMP certification is adopted for DAWIA PM Level I (basic), *TSPgM* certification is adopted for DAWIA PM Level II (intermediate), and *TSPfM* certification is adopted for DAWAI PM Level III (advanced), additional DAU training courses would need to focus on the areas least aligned, like Acquisition Law and Policy and International Acquisition and Exportability. Additional DAU training would be required in the areas not covered by PMI standards sufficiently, including the following:

- Acquisition Management
  - Capability Integration Planning

        - Acquisition Program Strategic Planning: understanding, developing, and framing an acquisition strategy that addresses requirements, resourcing, risks, and opportunities
    - Acquisition Policy and Law
        - Financial Management Laws, Directives, and Policies
        - Program Support Laws, Directives, and Policies
        - Technical and Engineering Laws, Directives, and Policies
        - Information Technology Laws, Policy, and Best Practices
    - Program Execution
        - Resource Management: understanding, developing, and enabling business process reengineering efforts
    - International Acquisition and Exportability
        - International Cooperative Programs
        - Sales and Transfers
        - Technology Security and Foreign Disclosure
        - Defense Exportability Integration
- Business Management
    - Contract Management
        - Presolicitation Planning and Execution: understanding the use interagency acquisition
        - Presolicitation Planning and Execution: understanding the different levels of data rights including unlimited, government purpose, limited, and restricted
- Technical Management
    - Engineering Management
        - Technical Planning: understanding, applying, and ensuring program protection, cybersecurity, and counterintelligence

Considering that 190 DoD PM competencies exist, the fact that PMI standards aligned reasonably well to all but the 12 highlighted here reinforces the recommendation to adopt the PMI standards.

4. Consider all three components of auditability.

In conjunction with the modification to its PM certification requirements, the DoD should consider the research of Eckerd and Snider (2017) and Rendon and Rendon (2015). Both sets of research emphasize the importance of ensuring capable processes and effective internal controls. While this research exclusively considered the development of competent personnel through an analysis of training standards, the DoD should ensure that correct measures are being taken in modifying training certifications and in developing effective processes to transition the workforce and the training staff to the new standards.

5. Revitalize the *U.S. Department of Defense Extension to: A Guide to the Project Management Body of Knowledge*.

To fill competency gaps that are not covered by PMI standards, the DoD should look to the *U.S. Department of Defense Extension to: A Guide to the Project Management Body of Knowledge* (DoD & DAU, 2003; PMI, 2017a). We also recommend that the DoD consider publishing similar DoD extensions to both the *TSPgM* and the *TSPfM* to cover the training of PMs for programs and portfolios.

References

Alie, S. S. (2016). *Interlocking program and project governance with PMI's process groups: How to form the proper baseline and tailor project/program governance* [Paper presentation]. PMI Global Congress 2016, Europe, The Middle East, & Africa (EMEA), Barcelona, Spain. https://www.PMI.org/learning/library/interlocking-program-project-governance-PMI-process-group-10175

Atkinson, R. (1999). Project management: Cost, time and quality, two best guesses and a phenomenon, it's time to accept other success criteria. *International Journal of Project Management, 17*(6), 337–342. https://doi.org/10.1016/S0263-7863(98)00069-6

Bernard, R. H. (1996). Qualitative data, quantitative analysis. *Journal of Computational and Applied Mathematics, 8*(1), 9–11. https://doi.org/10.1177/152582 2X960080010401

Bond, D. P., Davis, S. M., & Pearsall, A. D. (2016). *The Goldwater—Nichols Act of 1986: 30 years of acquisition reform* [Master's thesis]. Naval Postgraduate School (NPS). Calhoun. NPS Archive. https://calhoun.nps.edu/handle/10945/51649

Choi, D. (2009). *A study on improving defense acquisition through the application of Defense Acquisition Workforce Improvement Act concept to defense industry workforce* [Master's thesis]. Naval Postgraduate School (NPS). Calhoun. NPS Archive. http://hdl.handle.net/10945/4571

Defense Acquisition Workforce Improvement Act, Pub. L. 101-510, 104 Stat. 1485 (1990). https://www.govinfo.gov/content/pkg/STATUTE-104/pdf/STATUTE-104-Pg1485.pdf

Department of Defense & Defense Acquisition University. (n.d.). *Certification standards & core plus development guide: Program management*. Defense Acquisition University Visual Arts & Press. https://icatalog.dau.edu/onlinecatalog/CareerLvl.aspx?lvl=1&cfld=9

Department of Defense & Defense Acquisition University. (2003). *U.S. Department of Defense Extension to: A guide to the project management body of knowledge (PMBOK Guide)*. Defense Acquisition University Visual Arts & Press. http://www.risk-services.com/DoDExtPMBOKJune2003.pdf

Eckerd, A., & Snider, K. (2017). Does the program manager matter? New public management and defense acquisition. *The American Review of Public Administration, 47*(1), 36–57. https://doi.org/10.1177/0275074015596376

Gansler, J. S., Berteau, D. J., Maddox, D. M., Oliver, D. R., Salomon, L. E., & Singley, G. T. (2007). *Urgent reform required: Army expeditionary contracting*. Report of the Commission on Army Acquisition and Program Management in Expeditionary Operations. https://ogc.altess.army.mil/Documentation/EandF/Guidance/Gansler%20Commission%20Report_Final%20Report_10-31-07.pdf

General Accounting Office. (1995). *High-risk series: An overview* (Report No. GAO/HR-95-1). https://www.gao.gov/products/hr-95-1

Government Accountability Office. (2010). *Defense acquisition workforce: DoD's training program demonstrates many attributes of effectiveness, but improvement is needed* (Report No. AO-11-22). https://www.gao.gov/products/gao-11-22

Government Accountability Office. (2018a). *Defense acquisition workforce: Opportunities exist to improve practices for developing program managers* (Report No. GAO-18-217). https://www.gao.gov/products/gao-18-217

Government Accountability Office. (2018b). *F-35 Joint Strike Fighter: Development is nearly complete, but deficiencies found in testing need to be resolved* (Report No. GAO-18-321). https://www.gao.gov/products/gao-18-321

Government Accountability Office. (2019a). *High-risk series: Substantial efforts needed to achieve greater progress on high-risk series* (Report No. GAO-19-157SP). https://www.gao.gov/products/gao-19-157sp

Government Accountability Office. (2019b). *Improving program management: Key actions taken, but further efforts needed to strengthen standards, expand reviews, and address high-risk areas* (Report No. GAO-20-44). https://www.gao.gov/products/gao-20-44

Holtzman, J. (1999). Getting up to standard. *PM Network, 13*(12), 44–46. https://www.PMI.org/learning/library/ansi-standard-5057

Kupec, C. (2013). *Project management professional training needs for defense industry projects* [Doctoral dissertation]. Old Dominion University. ODU Digital Commons. https://digitalcommons.odu.edu/stemps_etds/64

MacStravic, J. A. (2016, September 6). *Program management functional career field competencies* [Memorandum]. Department of Defense. https://www.dau.edu/training/career-development/program-management/Lists/Blog/Attachments/29/Prog%20Mgmt%20Funct%20Competencies_160906%20(003).pdf

Mortlock, R. F. (2016, April–June). Stratcom strong. *Army AL&T Magazine*, 126–129. https://asc.army.mil/docs/magazine2/armyalt-apr-jun2016.pdf

Mortlock, R. F. (2020, Spring). Been there, done that: The profession of acquisition. *Army AL&T Magazine*, 72–77. https://asc.army.mil/armyalt/Spring2020/html/7.html

National Defense Authorization Act for Fiscal Year 2020, Pub. L. No. 116–92 § 861 (2019). https://www.congress.gov/bill/116th-congress/senate-bill/1790/text

Office of the Under Secretary of Defense for Acquisition & Sustainment. (2020a). *Operation of the adaptive acquisition framework* (DoDI 5000.02). Department of Defense. http://acqnotes.com/wp-content/uploads/2014/09/DoD-Instruction-5000.2-Operation-of-the-Adaptive-Acquisition-Framework-23-Jan-2020.pdf

Office of the Under Secretary of Defense for Acquisition & Sustainment. (2020b). *The defense acquisition system* (DoDD 5000.01). Department of Defense. https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodd/500001p.pdf?ver=2020-09-09-160307-310

Pernin, C. G., Axelband, E., Drezner, J. A., Dille, B. B., Gordon IV, J., Held, B. J., McMahon, S., Perry, W. L., Rizzi, C., Shah, A. R., Wilson, P. A., & Sollinger, J. M. (2012). *Lessons from the Army's Future Combat Systems program* (Report No. HQD105725). RAND. https://www.rand.org/content/dam/rand/pubs/monographs/2012/RAND_MG1206.pdf

President's Blue Ribbon Commission on Defense Management. (1986). *A quest for excellence: Final report to the president*. Government Printing Office. https://catalog.hathitrust.org/Record/001087702

Project Management Institute. (2017a). *A guide to the project management body of knowledge* (6th ed.). https://www.pmi.org/pmbok-guide-standards/foundational/pmbok

Project Management Institute. (2017b). *The standard for portfolio management* (4th ed.). https://www.pmi.org/pmbok-guide-standards/foundational/standard-for-portfolio-management

Project Management Institute. (2017c). *The standard for program management* (4th ed.). https://www.pmi.org/pmbok-guide-standards/foundational/program-management

Project Management Institute. (2020). *Project management institute certification types*. https://www.PMI.org/certifications/types

Redshaw, M. (2011). *Developing competencies required for directing major defense acquisition programs: Implications for leadership* (Publication No. 3510607) [Doctoral dissertation, University of Phoenix]. Proquest Dissertations and Theses Global. http://search.proquest.com/openview/3c8ebde08bf348e5c110f4ce06cc3319/1?pq-origsite=gscholar&cbl=18750&diss=y

Rendon, R. (2010). *Professionalization of the U.S. defense acquisition workforce: Progress, problems and future directions* [Faculty publication, Naval Postgraduate School]. NPS Archive: Calhoun. http://hdl.handle.net/10945/40376

Rendon, R. (2019, May 8-9). Enhancing professional and technical excellence: Analysis of contract management competency models. In RADM James Greene, USN (Ret.) (Chair), *Proceedings of the 16th Annual Acquisition Research Symposium*, Naval Postgraduate School, Monterey, CA. https://dair.nps.edu/handle/123456789/2771

Rendon, R., & Rendon, J. (2015). Auditability in public procurement: An analysis of internal controls and fraud vulnerability. *International Journal of Procurement Management, 8*(6), 710–730. http://www.inderscience.com/offer.php?id=72388

Ross, D. W., & Shaltry, P. E. (2006). *The new PMI standard for program management* [Paper presentation]. PMI Global Congress 2006, Europe, The Middle East, & Africa (EMEA), Madrid, Spain. https://www.pmi.org/learning/library/new-pmi-standard-pm-8179

Schwartz, M. (2010). *The Nunn–McCurdy Act: Background, analysis, and issues for Congress* (CRS Report No. R41293). Congressional Research Service. https://apps.dtic.mil/sti/citations/ADA524187

Shenhar, A., & Dvir, D. (2004, July 14). *Project management evolution: Past history and future research directions* [Paper presentation]. PMI Research Conference, London, England. https://www.PMI.org/learning/library/project-management-evolution-research-directions-8348

Woolsey, J. (2019). *2019 annual report: Transforming acquisition training*. Defense Acquisition University Visual Arts & Press. https://www.dau.edu/about/Documents/AnnualReport.pdf

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