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A Comparison of Government and Industry Program Manager Competencies

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Panel 4. Improving Acquisition Workforce Quality and Effectiveness

Wednesday, May 14, 2014	
11:15 a.m. – 12:45 p.m.	**Chair: J. David Patterson,** Director, North American JDA Partnerships, N12 Technologies ***Measuring Acquisition Workforce Quality Through Dynamic Knowledge and Performance: An Exploratory Investigation to Interrelate Acquisition Knowledge With Process Maturity*** Mark Nissen, Naval Postgraduate School Rene Rendon, Naval Postgraduate School ***Learning Organizations: Their Importance to Systems Acquisition in DoD*** Robert Tremaine, Defense Acquisition University Donna Seligman, Defense Acquisition University ***A Comparison of Government and Industry Program Manager Competencies*** Roy Wood, Defense Acquisition University

A Comparison of Government and Industry Program Manager Competencies

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Abstract

In 2010, the author presented a paper that examined Defense Department program manager (PM) competencies, as observed and reported in a survey by their industry PM counterparts. The current study mirrors that 2010 effort in examining how government PMs view their industry partners. Together, this paper compares and contrasts the findings from the two surveys. Since government and industry work closely together to manage large, complex Defense Department programs, the hope was to observe some complementary skills and abilities. The data gathered from this survey indeed shows this to be the case, but also reveals a number of key shortfalls in both technical and leadership/management skills. The results of this study may be useful in suggesting program management improvements as well as informing training and development strategies to improve program outcomes.

Introduction

The U.S. Department of Defense manages large, complex programs using a project management paradigm and structure with a civilian or military program manager leading a team of government engineers, logisticians, business and financial managers, contracting officers, and administrative personnel. The team also oversees one or more contracts with the defense industry to accomplish the design, development, and test of new systems. Most of these cutting-edge projects involve innovations that have never been attempted and, therefore, rely on close collaboration between the government and industry to bring the projects to fruition. A close working relationship between the government and industry program managers is therefore essential to success. Working closely together, government and industry PMs have the opportunity to view and assess the competence of their counterparts. Leveraging this close working relationship, this study, along with the previous effort, asked groups of these program managers to assess the skills and abilities of their contemporaries on the opposite side of the negotiating table.

Going into the studies, it was not expected that government and industry PMs would have identical strengths, as the work of each is different. The government PM in a typical defense project works closely with sponsors or warfighters to understand the requirements that will frame a new system's capabilities. The government team may also be responsible for translating these requirements into performance goals or specifications. The government team is also responsible to create the procurement and contracting approaches to be used, the test and evaluation plan, and the strategy for supporting the system over its lifecycle, and the initial cost and schedule estimates for the program. To identify and bring one or more industry partners onboard, the government team also creates a contract solicitation and accepts proposals and bids from industry.

In response to the government solicitation, an interested industry team analyzes the government's stated requirements, usually with a "capture team" practiced in the art of interpreting and responding to these opportunities. The team examines the stated needs as well as its own portfolio of technical developments and ongoing research efforts to uncover

promising solutions, then does its own estimates of cost and schedule and formulates a business case for bidding on the project. The team then writes its proposal and develops a bid to present to the government. The description here is necessarily simplified; the actual process may take months and involve thousands of engineers, business professionals, writers, and graphic artists to put together a technically viable and economically sound bid and proposal that the company has confidence will beat their competition.

After a contract is awarded, the government team works closely with its industry partner to proceed to system development. The industry team begins a rigorous system engineering process of transforming requirements and systems performance specifications to technical specifications and a work breakdown structure (WBS). Cost account managers are assigned tasks at the lowest WBS levels, where tasks are allocated resources and schedule. As tasks are executed and resources expended, the contractor reports details to the government team that is responsible for overseeing progress and helping resolve challenges and issues in execution.

Throughout the development, the government PM must advocate and negotiate for program funding; adjudicate requirements; and oversee program scope, schedule, personnel, and myriad other details. Likewise, the industry PM must attend to the technical and business details of the emerging system, seek out and manage capable subcontractors, and strive to efficiently execute the program to maintain profitability and/or earn incentive fees under the contract. Together, the government and industry PMs must be vigilant and collaborative in evaluating alternative technologies and industrial processes, monitoring spending and adhering to program schedules. They must assess technical performance and quality of workmanship of the emerging system, assess and mitigate risks, and provide sufficient leadership and managerial discipline to deliver the program successfully within cost and schedule constraints.

Both government and industry program managers must be technically competent, demonstrate key business competencies, and exercise leadership in executing the large, complex program. Fox and Miller (2006) summed up this challenge:

> Managing [a large complex project] is more than a science; it is a continually evolving art. ... Managers must augment a strong foundation of conventional management skills in planning, organizing, and controlling, with knowledge of the requirements, resources, and constraints of a specific project as it progresses. (p. 109)

While common competencies are critical, some differences based on roles and responsibilities are expected. The industry PM, for example, is likely to have a sharper focus on the technical details of the ongoing work packages and the resources needed to execute them, while the government PM may be focused more on “bigger picture” oversight and working the Planning, Programming, Budgeting, and Execution (PPBE) system to secure resources for the program several years hence. The industry PM must manage key stakeholders within the company and industry, while the government PM is likely to have a stakeholder group that includes OSD and service oversight, Congress, and the press. The skills of both PMs may be similar, but the focus will necessarily be different.

Purpose of the Study

Given that both government and industry PMs must possess an expansive portfolio of required competencies, it would be informative to understand which competencies may be considered by both industry and government PMs as most important in helping to assure program success. For example, a good deal of the literature on PM competencies, such as

that by Bauer (2006), asserted that *management competence (soft skills)* is more important for defense and aerospace program managers than *technical skills*. However, Wood's 2010 study of government PMs refuted this finding for government PMs and found that a relative balance in the *importance* of *technical and managerial skills* was important. This study will again look at competency importance to see if the new data adds insight to this apparent dilemma in the literature. Further, understanding how well government and industry PMs actually perform against key competencies may shed light on issues of strengths and development needs. In 2010, Wood found that government PMs were viewed by their industry counterparts as relatively weak in the *performance* of technical skills, particularly developing a budget, implementing change controls, and determining program deliverables. This study will seek to uncover specific perceived strengths and weaknesses in industry PM performance, and also look at these in the context of a government–industry team.

In summary, the purpose of the current effort was to mirror the 2010 study and examine the competencies of industry PMs from the government PM perspective. This study sought to understand how practicing government PMs viewed the importance of each of the competencies to program success, and how well their industry counterparts performed in each area. Throughout, the data from the current study will be compared and contrasted with the results of the 2010 study, where industry PMs offered a similar assessment of their government PM counterparts.

Research Questions

The following are the research questions for this study:

1. Which project management competencies are perceived by government program managers as most important in their industry program manager counterparts to assuring program success?
2. How well are industry program managers perceived by their government peers to be meeting those competencies?
3. How do the results of this study compare to those of the previous study (Wood, 2010) of government program managers from an industry perspective?

The Need for Competent Defense Program Managers

The literature on competencies, in general, and project/program managers, in particular was reviewed in Wood (2010). That literature will not be reviewed again here, but suffice it to say that competencies are important to understanding the key skills and abilities needed to be successful in a particular job. Competencies are used extensively for training and development, as well as selection and promotion. For those reasons, gaining a clear and objective view of program manager competencies remains a worthwhile undertaking.

Research Methodology

In this study, as in the 2010 study, the independent variables were a set of PM competencies derived from Golob (2002). These included 20 technical (hard) skills and 15 leadership/management (soft) skills, defined below.

Technical Project Management (Hard Skills) Competencies (C1-20)

C1. Determine program goals. The ability to work with program stakeholders in order to understand the program's requirements and specifications

C2. Determine program deliverables. The ability to work with program stakeholders to generate a scope of work, requirements, and/or specifications for the program

C3. Technical ability. The ability to understand and be conversant in the core technologies of product/deliverables of the program

C4. Document program constraints. The ability to lead the program team to uncover and document possible program constraints that could affect program completion

C5. Document program assumptions. The ability to lead the program team to determine information that must be validated or situations that must be controlled during the program process in order to facilitate program planning

C6. Define program strategy. The ability to evaluate possible strategies or alternative approaches to meet the program's requirements and/or specifications

C7. Quality assurance. The ability to identify performance criteria using product/service specifications, technical expertise, and standards to ensure performance standards are met, customer expectations are met, and processes are analyzed for further improvements

C8. Identify resources requirements. The ability to identify key resource requirements needed to support planning and decision-making

C9. Develop a budget. The ability to complete cost estimates and produce a program budget to support planning and decision-making

C10. Create a work breakdown structure (WBS). The ability to use the scope of work and other project documents to develop a work breakdown structure to facilitate project planning

C11. Develop a schedule. The ability to complete a program schedule that supports planning and decision-making

C12. Develop a resource management plan. The ability to develop and publish a resource management plan (human resources, procurement, etc.) by identifying resource requirements and obtaining commitment from internal and external assets that enable completion of all program activities

C13. Establish program controls. The ability to establish program controls by establishing targets and plans, measuring actual performance, comparing actual performance against planned performance, and taking necessary actions to correct the situation

C14. Develop program plan. The ability to develop a formal comprehensive program plan documenting deliverables, acceptance criteria, process, procedure, and tasks to facilitate program completion

C15. Communicate program status. The ability to produce program reports and presentations that provide timely and accurate program status and decision-support information to upper management, customers, and fellow team members

C16. Measure program performance. The ability to compare actual results to a documented baseline in order to identify program trends and variances

C17. Implement corrective action. The ability to take timely corrective action by addressing the root causes in the problem areas in order to eliminate or minimize negative impact to the program

C18. Implement change control. The ability to track and document all potential improvements and other changes in scope, specifications, cost, or schedule and analyze the consequences of these changes in relation to the overall project

C19. Respond to risk. The ability to respond quickly to risk event triggers in accordance with the risk management plan in order to keep the program on schedule and within budget

C20. Conduct administrative closure. The ability to conduct financial closure and publish formal program closure documents

Leadership and Managerial (Soft Skill) Competencies (CS1-15)

CS1. Project leadership. The ability to set a vision, identify the action steps, and motivate others to maintain their commitment to program success. The ability to influence a team to willingly work toward predetermined program objectives

CS2. Flexibility. The ability to adapt and deal with situations and manage expectations during periods of change and uncertainty during a program

CS3. Sound business judgment. The ability to stay focused on the business target. The program manager knows the organization's business purpose of program and makes decisions within that context

CS4. Trustworthiness. The ability to build positive working relationships and credibility with team members, upper management, and stakeholders

CS5. Communication style. The ability to adapt one's communication style to fit the situation and the audience. The ability to present information without bias and exchange information in a clear and unambiguous manner

CS6. Listening Skills. The ability to ensure all team members have a chance to provide input to the program. The ability to read body language and perceive group dynamics

CS7. Setting and managing expectations. The ability to communicate with all program stakeholders, especially customers, and address program objectives, timelines, budgets, risks, and estimates. The ability to clearly communicate program changes and/or adjustments with support rationale to the customer in a proactive manner

CS8. Negotiations. The ability to develop win–win situations that culminate with both parties being satisfied with the final agreement

CS9. Issue and conflict resolution. The ability to understand and implement conflict resolution models for resolving issues and preventing the conflict from affecting the program's outcome

CS10. Organizational skills. The ability to arrange program activities in such a way that they systematically contribute to the program's goals

CS11. Coaching. The ability to provide feedback to team members and stakeholders in a positive manner that builds trust and credibility
CS12. Facilitation. The ability to facilitate or guide team members through a process that helps them discover answers and overcome barriers to successful program completion
CS13. Decision-making. The ability to make the best choice from among many alternatives
CS14. Problem solving. The ability to identify issues, to conduct accurate assessments of the issues, and propose viable solutions to issues
CS15. Team building. The ability to encourage and enable people to work together toward a common goal

Competency Survey

The survey instrument used in this study was identical to the questionnaire used in the Wood (2010) study. The 2010 survey questionnaire consisted of three parts: (a) ratings for technical (hard) skills, (b) ratings for leadership/management (soft) skills, and (c) demographic questions about the participants and their programs. In 2010, the survey instrument was subjected to an expert review, and data from a pilot study were validated through item analysis and Cronbach's alpha tests. Further validation for this study was unnecessary.

The 2010 online survey instrument asked each *industry* participant to assess the importance of the 20 technical and 15 management (soft-skill) competencies to program success, and then to assess how well, in his or her judgment, their *government* counterpart performed in those competencies. This current study sought to mirror those results by soliciting senior *government* PMs attending classes at the Defense Systems Management College to take an identical survey (hard copy rather than online surveys were used for convenience) assessing their *industry* counterparts.

In both surveys, the responses were based on a 5-point Likert scale. Participants were asked to assess the importance of each competency to program success with ratings from 1 (indicating that competency is *unimportant/not needed*) to a value of 5 (indicating that the competency is *extremely important*). In assessing performance against each competency, the participant rated each from 1 (indicating that the PM is *not meeting the competency*) to a value of 5 (indicating that the PM is *working at an expert level*). Four demographic questions were asked about the study participant and his/her program experience.

Survey Responses

Using the 2005 GAO (p. 14) estimate of 729 programs in the Department of Defense, an appropriate sample size was calculated. Alreck and Settle (1995) suggest a non-probability sample of about 10% of the parent population, or approximately 73 respondents, based on the estimated population. In 2010, 146 industry respondents completed the online survey; this 2014 survey received 78 government responses.

Demographics

The survey asked four questions to help understand the study participants and the programs they managed:

1. How many years experience do you have as a program/project manager?

2. What is the Acquisition Category (ACAT) rating of your program?
3. What is the acquisition phase of your program?
4. On average, how often do you communicate with the government program manager (face-to-face, telephone, e-mail, other)?

Government PM Responses (2014 study). Fifty percent of government respondents indicated that they had 10 or more years of experience, and 72% reported managing large (ACAT I or II) defense programs. These responses indicate that participants were experienced program managers with significant responsibility. They should, therefore, have a good understanding of the competencies required to manage large programs.

Nearly half of government PMs (46.1%) reported managing relatively mature programs that were in production and deployment. When asked to rate the frequency of interaction with their government counterparts, 58% of participants indicated that they communicated with their government counterparts very often or daily, indicating that responses were generally well informed.

Industry PM Responses (2010 study). Over 78% of participants reported that they had 10 or more years of experience, and nearly half (48%) reported that they managed large, complex programs (ACAT I or II). Almost half the participants indicated that their programs were beyond development and into the later, more mature production and deployment phases. When asked to rate the frequency of interaction with their government counterparts, 64% indicated very often or daily communication with their government counterparts.

Demographic responses from government and industry surveys are shown in Table 1.

Table 1. Survey Demographics

	2010 Industry (% Total)	2014 Government (% Total)
Experience (years)		
15 or more	44.1	21.8
10 to 14	34.5	28.2
5 to 9	13.1	30.8
0 to 4	8.3	19.2
Program Category		
ACAT I	37.2	52.6
ACAT II	11.0	19.2
ACAT III	4.8	11.5
Other	46.9	16.7
Program Phase		
Production and Deployment	49.0	46.1
System Design & Dev.	36.6	29.5
Technology Dev.	13.1	16.7
Concept Refinement	1.4	7.7
Communication Frequency		
Daily	30.1	25.6
Very Often	33.6	32.1
Often	14.7	26.9
Occasional or Infrequent	21.7	15.4

Comparison of Demographics. The respondents from both industry in 2010 and government in 2014 had programs in comparable phases and reported similar communication frequencies. Differences in two of the demographics stand out, however: experience and program size. The government participants had less program management experience while managing larger programs (see Figure 1). While this is not particularly surprising to those in defense acquisition, the disparity continues to attract the blame for program failure. Fox (2011) observed that, "after fifty years, we know that an Army or Air Force colonel or Navy captain (O-6) with limited industrial management knowledge and experience is ill prepared to direct and oversee a first-of-a-kind multi-hundred million dollar industrial program with hundreds of complex challenges and dilemmas" (p. V-15).

The 2009 OSD Study of Program Manager Training and Experience also offered several independent findings and recommendations that appear to corroborate the demographic differences seen here. Among other things, the report noted, "program manager careers need more aggressive planning and execution to ensure that PMs have preparatory assignments and experiences necessary for proficient management of ACAT I/II acquisition programs" (Ahern, p. 8).

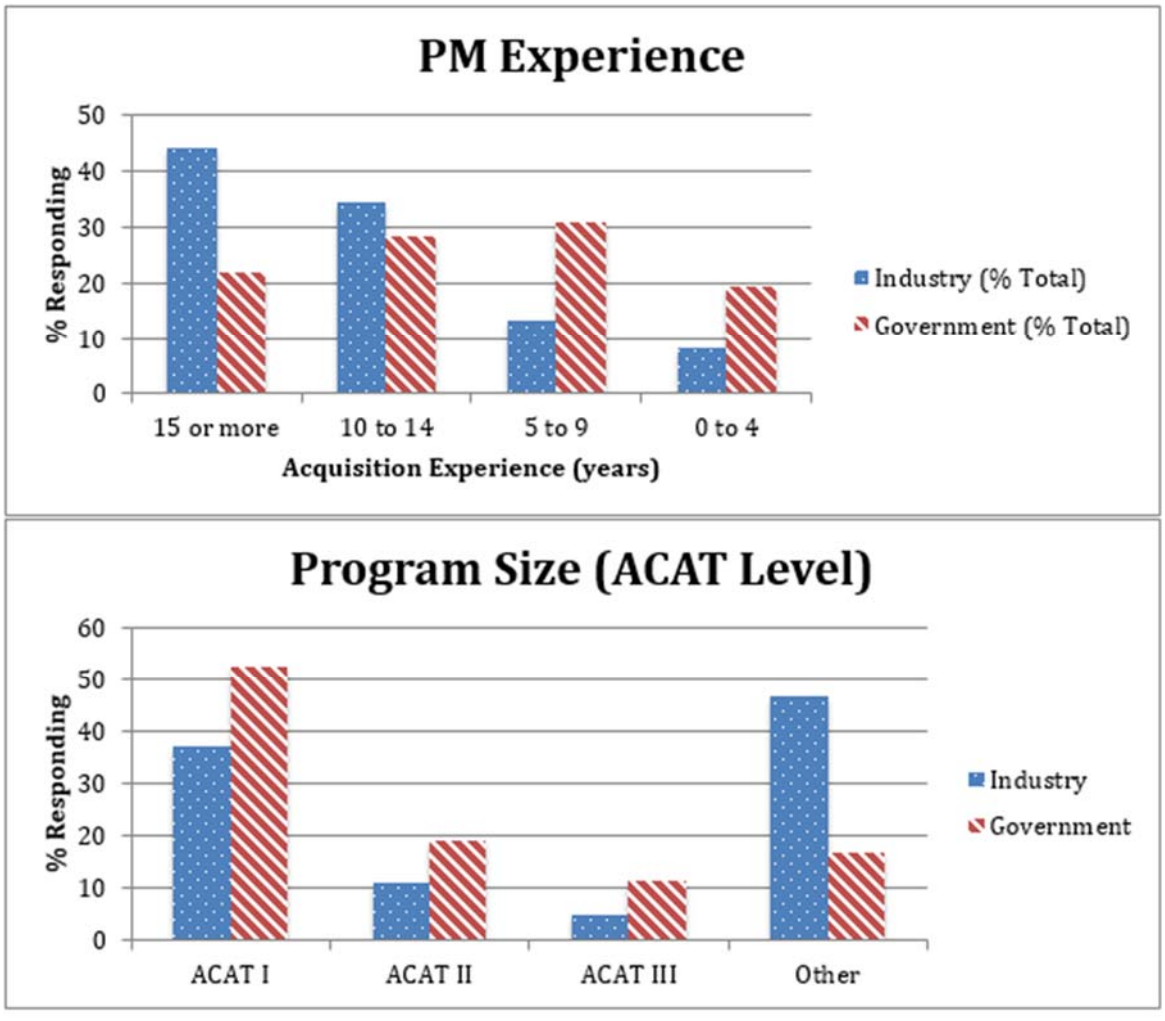

Figure 1. PM Experience and Program Size Comparison

Research Question 1: Which project management competencies are perceived as most important to assuring program success?

Identical survey data were collected and analyzed in 2010 and 2014 to address the first research question. Participants responded to a list of 20 technical competencies (C1 through C20) and 15 leadership/management competencies (CS1 through CS15), rating the relative contribution of each competency to program success. Each competency was listed on the questionnaire with Likert-scale choices of *Very Important, Important, Neutral, Unimportant,* or *Very Unimportant.* Figure 2 shows the rank-ordered average scores for each of the competencies in both the 2010 and 2014 studies.

Ranking of Competency Importance

The data show that most of the competencies scored quite high for their contributions to program success on both industry (2010) and government (2014) studies. The generally high scores across all the competencies affirmed the choice of appropriate skills and abilities that are viewed as having an influence on program success.

Table 2 shows the top-10 rated competencies in both surveys. Note that the highest rated competencies in both government and industry groups were a mix of technical and leadership skills. A striking feature was the similarity between government and industry top-10 competency ratings. While the order was slightly different, nine of the 10 competencies in each list were identical. Technical skills identified as most important by both groups included the following: *determine program goals* (C1), *developing a budget* (C9) and *schedule* (C11), *documenting program constraints* (C4), and *implementing corrective action* (C17). Leadership/management skills in common were *trustworthiness* (C4), *project leadership* (C1), *decision-making* (CS13), and *team building* (CS15). The two unique skills, both incidentally third on each list, were, for government—*determining program deliverables* (C2), and for industry—*communicating program status* (C15).

Government Responses (2014). Government PMs rated industry *trustworthiness* (CS4) as most important of the competencies. The importance of trust to organizational and inter-organizational success has been widely documented in the literature (Jehn & Mannix, 2001; Joseph & Winston, 2005; Wells & Kipnis, 2001). Trust may be particularly important in large, complex projects where not every expectation can be explicitly stated in the contract. The one top-10 difference on the government list was industry's ability to *communicate program status* (C15). Since industry is likely to have the more detailed and timely view of program status, it makes sense that government PMs assessed this as a uniquely desirable skill.

Industry Responses (2010). The most valued skill among industry participants was the *ability to determine program goals* (C1), which also ranked second on the government list. Pinkerton (2003, p. 53), among others, pointed out that the first criterion for project success is to have clearly defined goals and objectives. Also important to industry is for the government to be *trustworthy* (CS4). The unique item on the industry list was for their government counterparts to be able to clearly *determine contract deliverables* (C4). Articulating precisely what the government wants and when these should be delivered is important for reducing uncertainty. Industry can potentially suffer significant rework and loss of confidence if trying to guess what the government wants and ultimately not meeting expectations.

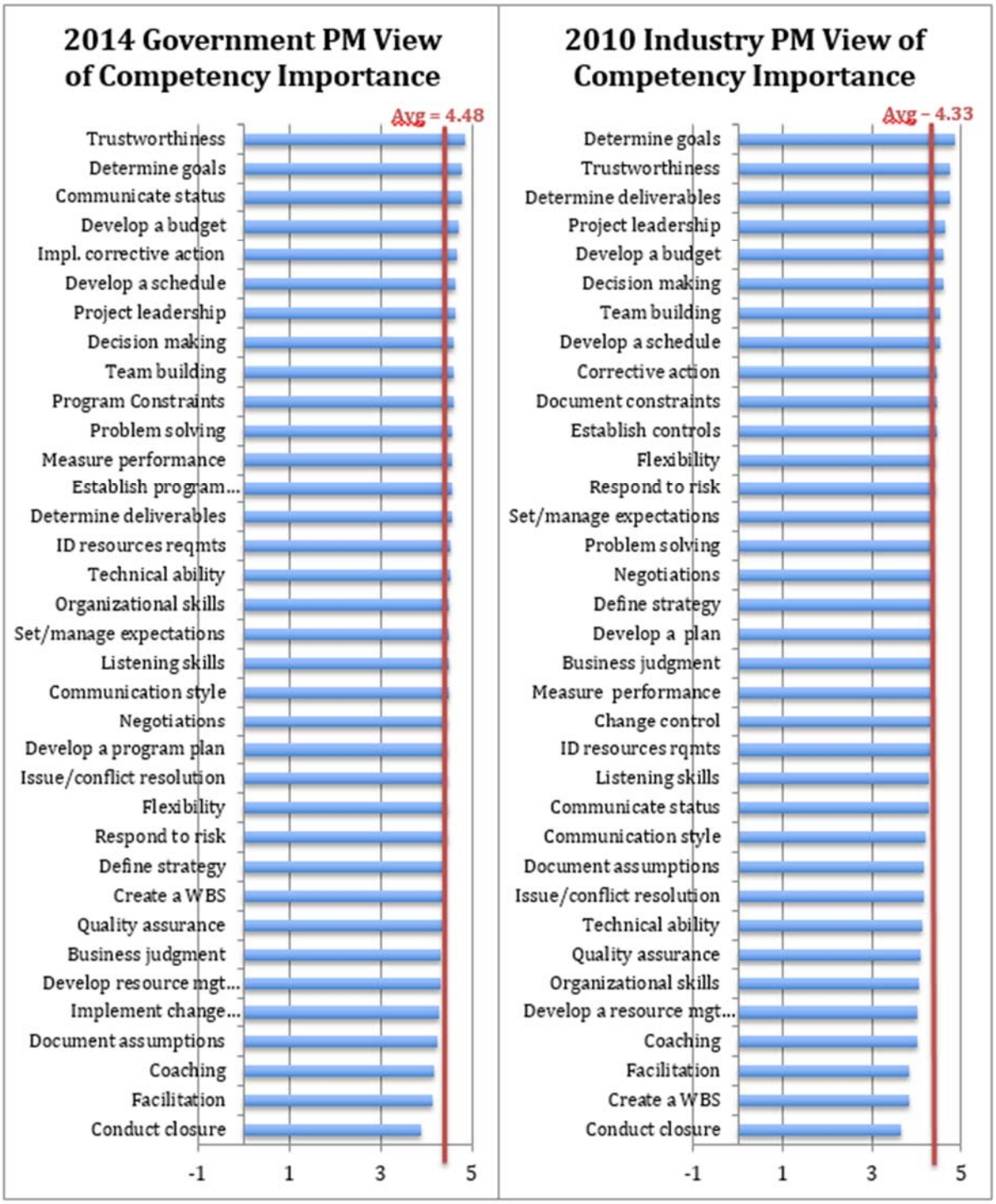

Figure 2. Competency Importance (Government & Industry)

Table 2. Top 10 Important Competencies

Government Respondents (2014)		Industry Respondents (2010)	
Industry Competencies Most Important to Program Success	**Mean Score (1–5 scale)**	**Government Competencies Most Important to Program Success**	**Mean Score (1–5 scale)**
Trustworthiness (CS4)	4.85	Determine Program Goals (C1)	4.86
Determine Program Goals (C1)	4.79	Trustworthiness (CS4)	4.75
Communicate Program Status (C15)	4.77	Determine Program Deliverables (C2)	4.75
Develop a Budget (C9)	4.71	Project Leadership (CS1)	4.65
Implement Corrective Action (C17)	4.68	Develop a Budget (C9)	4.62
Develop a Schedule (C11)	4.64	Decision Making (CS13)	4.60
Project Leadership (CS1)	4.63	Team Building (CS15)	4.54
Decision Making (CS13)	4.60	Develop a Schedule (C11)	4.53
Team Building (CS15)	4.59	Implement Corrective Action (C17)	4.47
Document Program Constraints (C4)	4.59	Document Program Constraints (C4)	4.47

Competency Importance and PM Demographics

One might ask whether PM experience level, program complexity (ACAT-level), program maturity (phase), or frequency of communication between the government and industry PM would have any effect on how the PMs rated each of the competencies for importance. Program managers with substantial experience might have better insights, for instance, into practitioner competencies that really matter most. Similarly, program managers of large, complex programs have a greater scope of responsibility and a substantially larger span of control, and, conceivably, require a different set of skills and competencies. PMs in development programs may likewise believe a different competency set is needed than those for a PM of a program in production. Finally, the frequency of interaction between industry and government PM may indicate how collaboratively they operate as a team, and whether certain competencies are more or less important in such an environment. To determine whether demographics had an influence on PMs' assessment of the importance of the various competencies, Student t-Tests were performed on both the 2010 data and the 2014 data. The results follow:

Experience. In 2010, Industry PMs with 10 or more years of experience rated government PM *decision-making* (CS13) skills statistically more highly, while those reporting less than 10 years of experience valued the government PMs' *communication style* (CS5). In the 2014 survey, senior government PMs with greater than 10 years experience more highly valued their industry counterparts' abilities to develop *budgets* (C9) and *schedules* (C11). Interestingly, experienced industry PMs valued leadership soft skills in their government partners, while senior government PMs valued technical skills in their industry counterparts.

Program Phase. In 2010, Industry PMs showed no difference in their assessment of competency importance based on Program Phase, but the 2014 study indicated that government PMs' in phases earlier than production and deployment favored their industry counterparts' abilities to *identify program resource needs* (C8), *develop a program plan* (C14), *respond to program risk* (C19), and *conduct administrative closure* (C20). These skills may indeed be more important in managing less mature programs where there is greater need for planning flexibility, greater uncertainty in resource needs, higher and more varied risks, and higher potential to terminate the program for technical or programmatic causes.

Program Category and Communication Frequency. No statistical differences were found based on t-Tests of these variables in either the 2010 or 2014 studies. Neither the size/complexity of the programs nor the level of collaboration had significance in differentiating competencies. This was a somewhat surprising and counterintuitive finding.

Research Question 2: How well are program managers perceived to be meeting those competencies?

Survey data were also collected in the 2010 and 2014 studies to answer the second research question regarding performance of each of the competencies. The questionnaire asked participants to respond to each of the competencies with their assessment of how well their PM counterpart met the competency using Likert scale ratings of *Expert, Good, Average, Fair, or Poor*. Figure 3 summarizes the rank-ordered response for each competency.

The average of the competency ratings that government PMs gave their industry colleagues was 3.65, and industry rated government PMs substantially lower at 3.12 (on a scale of 5). It seems noteworthy that the average from all the participants rates both government and industry PM performance between *average* and *good*. No government PM competency broke the 4.0 (*good*) threshold, and only two industry competencies were rated, on average, above 4.0 (*good*): *technical ability* and *business judgment*. These are certainly important competencies, but overall the performance ratings were disappointing, given the high stakes and expectations for managing billions of taxpayer dollars to provide critical defense systems to the warfighter.

Examining the top-10 rated competencies for government and industry (Table 3), there are six common competencies between the two lists. Competencies in common (though in different rank order), are the following: *technical ability* (C3), *trustworthiness* (CS4), *problem solving* (CS14), *determining program deliverables* (C2), *decision-making* (CS13), and *determining program goals* (C1). These are all critical skills to managing large, complex projects and, while the absolute scores are not high, relatively high performance on these competencies is heartening.

Government Responses (2014). Unique ratings in the top-10 list for Industry PMs included *sound business judgment* (CS3), *organizational skills* (CS10), the ability to *identify resource requirements* (C8), and *develop a budget* (C9). Given the role and position of industry, it is not surprising that these PMs were rated more highly on business judgment, resource requirements, and budgeting abilities. The profit motive and contractual requirements drive industry PMs to pay close attention to the business case and financial details of the program. These particular skills do not show up in the top-10 ratings for the government PM, whose role is to secure macro-level funding in broad “color of money” categories, such as RDT&E, O&M, and Procurement, and whose main goal is to (perversely) spend money as quickly as possible to meet obligation and expenditure rates set by government comptrollers. Industry PMs are also ranked high in their organizational skills, managing hundreds, sometimes thousands, of skilled workers and subcontractors to design, develop, and deliver complex systems. On the government side, where this skill does not appear in the top 10, the PM typically manages far fewer individuals to provide program oversight. Organizational skills are important for the government PM, but the scope and nature of the task is different and in some ways less complex.

Industry Responses (2010). The most valued skills industry participants rated in their government counterparts were *project leadership* (CS1), their ability to *communicate program status* (C15), and their ability to *measure program performance* (C16), and provide *quality assurance* (C7). In a complex defense project, the government program manager

must be the leader who sets the vision and goals, motivates the team, adjudicates disagreements, negotiates changes, and is committed to program success. This pivotal role is inherently governmental and cannot be assumed by the industry manager. Related to this idea, the empowered government PM, with industry and stakeholder advice and assistance, must be willing and capable of making and influencing the myriad daily decisions and choices that shape the outcomes of a program. Given the number and diversity of program stakeholders, including Congress, the press, OSD, and services, the government PM must be a good communicator, able to clearly communicate program status within frames of reference each stakeholder can understand and appreciate. The other highly rated competencies of measuring program performance and providing quality assurance are related to the critical government oversight function. The government PM is ultimately responsible for the program meeting technical performance requirements and delivering within cost and schedule constraints. Accurately measuring industry's progress against expectations and assessing the quality of the products they deliver is a critical role of the government PM and program team.

Synergy. These top-rated competencies, particularly the unique ones articulated for government and industry, appear to be aligned with their respective roles in bringing a program to fruition. It appears that each group holds the important skills of their peers in high regard and rates their partners' performance more highly in these areas. Synergy gained from government and industry PMs performing well in both common and unique skill areas contribute to program success. That said, recall that the average scores for these competencies were not particularly high, and there is clearly room for improvement.

Competency Performance and PM Demographics

As with the assessment of competency importance, t-Tests were used to determine whether PM demographics influenced ratings of specific competencies.

Experience. In 2010, there were no statistical differences in the ratings of competencies, based on the experience of the participant. In the 2014 survey, however, less experienced government PMs (<10 years experience), more highly valued their industry counterparts' *business judgment* (CS3). This may be because the more junior government PMs have little business experience or acumen themselves, they rate their partners' abilities more highly and, perhaps, rely more on industry to advise them of program business and financial matters. One may infer that more experienced PMs have had the luxury of more training and experience working with industry, know how to interpret financial data better, and rely less on industry input than on their own assessments.

Program Complexity (ACAT). In 2010, again Industry PMs showed no difference in their assessment of competency performance based on Program ACAT level. In the 2014 study, government PMs with ACAT 1 programs judged industry's ability to *document program assumptions* (C5) as more important than those PMs with smaller programs. The largest and most complex projects are likely to have more technology developments, more complex integration, a larger trade space, and higher risks. More assumptions are expected, and documenting "framing assumptions" explicitly has been one of OSD's focus areas. Indeed, OSD's office for Program Assessment, Root Cause Analysis (PARCA) estimates that 28% of Nunn-McCurdy program breaches can be attributed to poor baseline cost and schedule estimates that are based on invalid framing assumptions ("Performance of the Defense Acquisition System," 2013, p. 35)

Program Phase. Again, no differences were found in the 2010 Industry PM responses, but in the 2014 study, government PMs of pre-production programs valued industry's ability to *determine program deliverables* (C2) more highly. This seems logical, as by the time a program has matured and transitioned into production, deliverables are well established with more predictable cost, schedule, and performance than those in earlier, less mature phases.

Communication Frequency. In the 2010 study, industry PMs engaging less frequently with their government counterpart gave a higher mean score to the government's ability to *develop a program plan* (C14), while those with more frequent contact considered the government PMs' *team building* (CS15) ability to be higher. Perhaps those industry PMs who were less frequently engaged with their government counterparts were more likely to rely on the government to formulate a program plan, while program planning was more collaborative otherwise. Similarly, those industry PMs with more frequent contact felt the government's team building abilities were better, perhaps because they were included in discussions and other communications.

Table 3. Top 10 Competency Performance

Government Respondents (2014)		Industry Respondents (2010)	
Highest Rated Industry Competencies	**Mean Score (1–5 scale)**	**Highest Rated Government Competencies**	**Mean Score (1–5 scale)**
Technical Ability (C3)	4.21	Trustworthiness (CS4)	3.62
Sound Business Judgment (CS3)	4.05	Technical Ability (C3)	3.45
Organizational Skills (CS10)	3.88	Communicate Program Status (C15)	3.43
Identify Resource Requirements (C8)	3.87	Determine Program Goals (C1)	3.42
Trustworthiness (CS4)	3.81	Measure Program Performance (C16)	3.35
Problem Solving (CS14)	3.79	Decision Making (CS13)	3.34
Determine Program Deliverables(C2)	3.79	Quality Assurance (C7)	3.32
Develop a Budget (C9)	3.78	Project Leadership (CS1)	3.30
Decision Making (CS13)	3.76	Problem Solving (CS14)	3.28
Determine Program Goals (C1)	3.76	Determine Program Deliverables (C2)	3.27

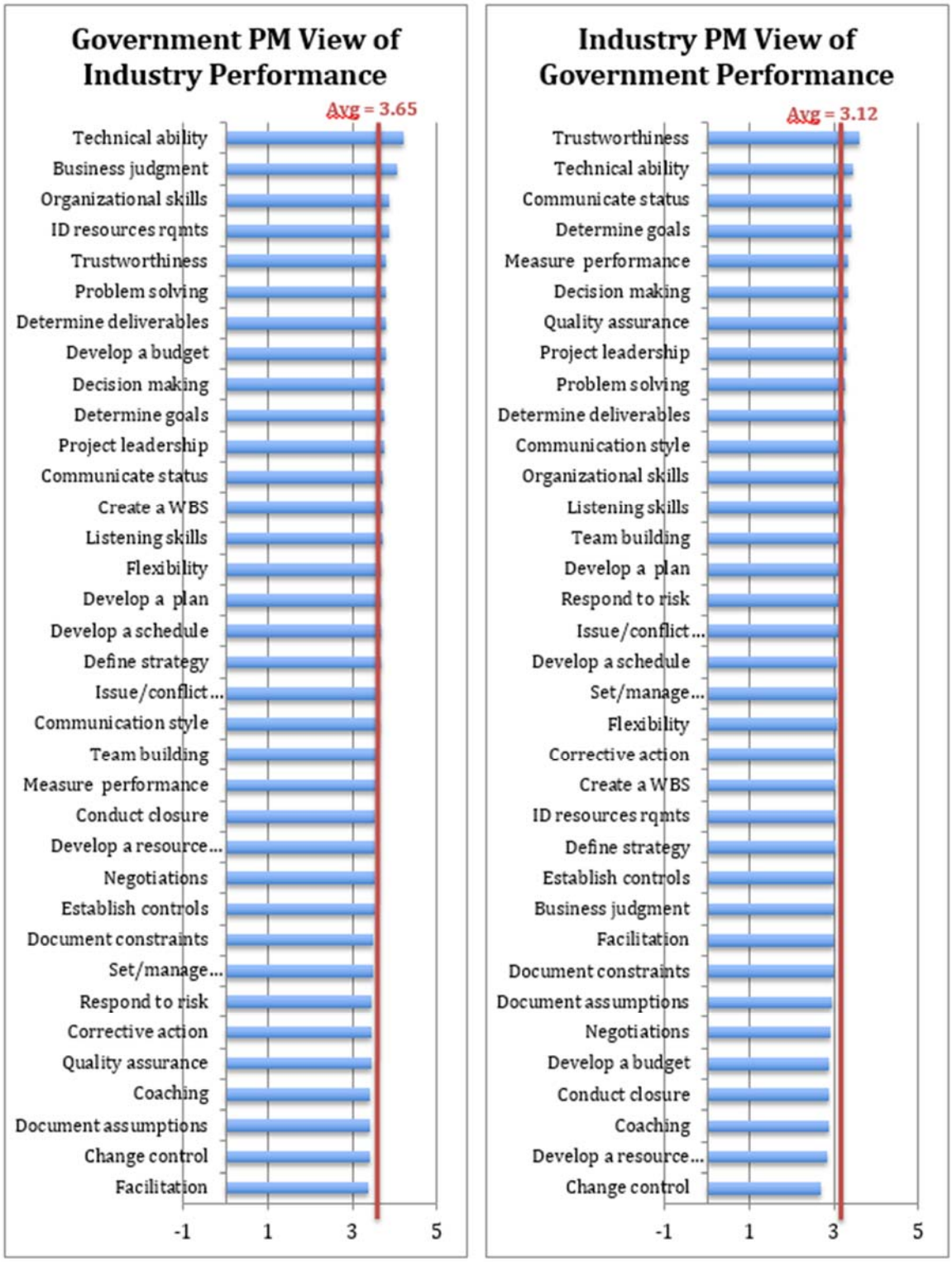

Figure 3. Competency Performance (Government & Industry)

Competency Performance Shortfall

Understanding both the importance and performance of the 35 competencies is valuable for insight into the key skills practicing PMs value in managing their programs. As noted earlier, however, the relatively low scores given to many competencies indicate potential development opportunities. To address this, quantitative performance shortfalls can be computed. The simplest method to examine shortfalls is to examine the lowest rated competency averages without regard to perceived importance. However, the downside to simply choosing the lowest rated competencies is that such a method does not consider the *importance* of each competency toward program success.

To ensure that the competency *importance* is considered when ranking competency shortfalls, a slightly more sophisticated computation is needed. Employing a weighting model used by Borich (1980), the difference between competency importance and competency performance was multiplied by the mean competency importance. That is,

$$\text{Shortfall} = \text{Importance} \times (\text{Importance} - \text{Performance}) \quad (1)$$

The top-10 list derived from the Borich model is shown in Table 4.

Table 4. Borich Model: Importance-Weighted Competency Shortfalls

Government Respondents (2014)		Industry Respondents (2010)	
Competency (Borich Model)	**I x (I-P)**	**Competency (Borich Model)**	**I x (I-P)**
Implement Corrective Action (C17)	5.70	Develop a Budget (C9)	7.91
Trustworthiness (CS4)	5.03	Determine Program Deliverables (C2)	7.06
Document Program Constraints (C4)	5.00	Implement Change Control (C18)	7.03
Determine Program Goals (C1)	4.98	Determine Program Goals (C1)	7.02
Communicate Program Status (C15)	4.95	Document Program Constraints (C4)	6.64
Establish Program Controls (C13)	4.74	Develop a Schedule (C11)	6.52
Set/Manage Expectations (CS7)	4.63	Establish Program Controls (C13)	6.38
Team Building (CS15)	4.59	Team Building (CS15)	6.38
Measure Program Performance (C16)	4.56	Negotiations (CS8)	6.35
Develop a Schedule (C11)	4.40	Implement Corrective Action (C17)	6.32

This list includes a number of common shortfalls of both government and industry PMs. These include the ability to *implement corrective action* (C17), *document program constraints* (C4), *determine program goals* (C1), *establish program controls* (C13), *team building* (CS15), and *develop a schedule* (C11). Shortfalls in these critical skills may be an indicator of why so many programs perform poorly. If jointly the government and industry PMs have difficulty articulating their goals for the program and understanding the constraints they are under, the program may drift along without firm direction or sense of purpose. In the absence of a good schedule of when critical events must happen and the interdependencies of the many tasks that must be accomplished and the program lacks proper controls to keep it under control, again, the program may stumble along haphazardly. Finally, if the PMs lack the ability to identify problems and correct them early, even damage-control efforts may come too late or be too feeble to save a foundering program.

Government Responses (2014). Among the unique skills found wanting in industry PMs were two of those deemed most important—*trustworthiness* (CS4) and the ability to *communicate program status* (C15). Perhaps most disturbing is that trustworthiness showed up on the shortfall list at all, given its importance to creating an environment in which government and industry can work together. An early but sure sign of a program in trouble is one in which trust is broken. Other shortfalls are industry's ability to *manage expectations* (CS7) and *measure performance* (C16).

Industry Responses (2010). Industry views several key government skills as also lacking. Among these is the ability to *develop a budget* (C9), *determine program deliverables* (C2), and *implement change control* (C18). Industry commits resources to a program with the expectation of stable and adequate funding to purchase materials and pay its employees to produce the things the government has asked for. When government is unable to provide a predictable funding stream, because of budget cuts, continuing resolutions, and so forth, industry is whipsawed with unproductive changes, fluctuations in workload and manpower, and inevitable cost increases. Similarly, if the government has not clearly and unambiguously specified program deliverables, and put a process in place to control changes, the industry PM will be continuously aiming at a moving target, again leading to unproductive changes, rework, and added costs. Also on this list is a perception that government PMs lack good *negotiating skills* (CS8), which are critical to maneuver the cost, schedule, and performance trade space of a complex defense program.

Discussion and Interpretation of Results

The two studies reported here help identify the competencies government and industry PMs need to be successful. Both studies point to the need for a balance of technical and management/leadership skills. In comparing the results of the two studies, it also becomes clear that the skills are, in many ways, complementary. Industry values government's ability to provide stable funding, and identify program goals and unambiguous deliverables—and stick to them. Government values industry's ability to honestly and accurately report program status and manage the myriad details of day-to-day development and production. Together the two PMs need to work out common objectives, explore and negotiate risks and opportunities, and, when necessary, implement corrective action.

In assessing the competencies of their peers, there was clearly room for improvement on both sides of the table. In general, government PMs are less experienced than their industry counterparts, and that seems to be reflected in lower overall competency scores, particularly in some technical and programmatic skills like budgeting, scheduling, and controlling changes. These skills can be learned, but need to be practiced and perfected on the job. More deliberate career management, less frequent rotations, and longer tenures could better equip the government PM for success. Recent efforts to establish a workforce qualification program may drive aspiring PMs to broader and deeper experiences on the job to better prepare them to lead complex projects.

For industry PMs, the shortfalls appear more problematic. The shortfall in trustworthiness is not easily corrected through training or experience, but must be addressed through incentives and culture change. Industry PMs must feel free to bring bad news forward quickly and work with their government counterparts to resolve the problems. Government PMs must encourage this and withhold, as best they can, punishment or penalty for reporting problems. Issues arise and problems are inevitable in complex, high-risk endeavors. Surfacing those and working collaboratively to solve them is the mark of a good program team.

Government and industry training establishments should look at strengthening their training programs in several specific areas. PMs should be better trained in program control—scheduling, resourcing, and earned value. Training should go beyond the mechanics, however, and focus on how changes and trends should be interpreted and used as indicators of potential problems. Too often, PMs are inundated with data while wanting for useful information. Similarly, PMs should be challenged to closely examine and clearly articulate their program goals, constraints, and framing assumptions. Often, those are lost or taken for granted by the third, fourth, or subsequent PM in a program and need to be re-

examined afresh to ensure that assumptions are still valid, constraints have not changed, and the goals are sufficient. Finally, the government and industry PM should meet frequently to compare notes, establish mutual expectations, negotiate agreements on processes and responsibilities, and build (or rebuild) the trust relationship.

Few would argue that the job of a program manager is multifaceted, fast-paced, and challenging. The successful PM must have good technical, programmatic, and business skills. He or she must also be able to lead and manage a diverse team of individuals toward the common goal of producing the world's most advanced warfighting machines. This study points out the importance of many of those skills from the perspectives of practicing government and industry program managers. It also points out some of the shortcomings they have observed in their counterparts that may explain why some programs fail to perform as expected. Clearly, with many powerful external stakeholders and forces beyond the control of the PM, not all failures can be placed on the shoulders of these individuals. However, PMs have the responsibility to do their best to maneuver the labyrinthine processes, mitigate the considerable risks, and deliver their programs on time and within budget. It is incumbent upon them to hone their own skills and abilities through daily practice, but their leaders also bear responsibility to provide them the best training and development possible.

Future Research and Action

The results of these two studies should continue to be analyzed for further insights, interpretations, and distinctions. Results should be compared to other recent studies for validation, and more in-depth explorations should be conducted on ways to address critical competency shortfalls. Additional studies should be considered to explore the key roles, responsibilities, and relationships of government–industry teams, including how to best leverage the synergies that already exist. Training and development establishments, like the Defense Acquisition University, should use these results to inform development of training curricula, workshops, and outreach assistance to address competency shortfalls. Finally, government and industry PMs should take to heart the feedback given by their peers and use these results for self-improvement and more productive collaboration.

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