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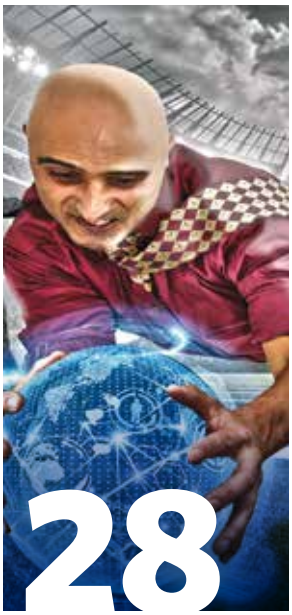

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Agile Values in the MQ-9 Reaper's SOFTWARE DEVELOPMENT

Andrew Smith

AT ANY CONFERENCE OR FORUM ON DEFENSE ACquisItion in the last few years, you would have heard one word repeated almost relentlessly: "Agile." Search the Web and you'll find a number of articles and briefing charts highlighting the challenges of adopting Agile principles in the context of a weapon system. Typically, the discussion centers on shifting away from the waterfall approach, addressing systems engineering, and getting through various certification and testing authorities. Let me share my experience in successfully applying Agile values and principles to the acquisition program of the Special Operations Command (SOCOM) MQ-9 Reaper unmanned air vehicle (UAV) without dictating a particular software development methodology.

The histories of the MQ-1 Predator and MQ-9 Reaper UAVs have been well documented in various media. In 2006, a validated requirement emerged from the Quadrennial Defense Review for a Special Operations Forces (SOF) "unmanned aerial vehicle squadron to provide organic capabilities." With requirements in hand, a new modification program, called Medium Altitude Long Endurance-Tactical, or MALET, was initiated between SOCOM's acquisition office and the Air Force Predator Systems Squadron. Under an agreement between the two offices, requirements and funding would be generated by SOCOM, while contract management would largely be executed by a team at Wright-Patterson Air Force Base in Dayton, Ohio. In parallel, Air Combat Command (ACC) agreed to transfer personnel, aircraft and ground control stations to Air Force Special Operations Command (AFSOC) to stand up MQ-1 and MQ-9 Combat Air Patrols directly supporting SOF missions.

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While no release was delivered on the date that was projected at project inception, slips were measured in days and weeks—not months and years.

Initially, the MALET program operated somewhat independently from the Air Force acquisition program. Modifications were typically "bolt-on" upgrades that didn't significantly alter the baseline configuration. After twice fielding a software release—also called Operational Flight Program (OFP)—derived from an ACC version in order to support urgent requirements, SOCOM sought increased independence over its fielding schedules and initiated a Combat Evaluation called Lead-Off Hitter (LOH). Originally, the effort was an 18-month acquisition experiment to rapidly assess and field new capabilities on a limited number of AFSOC aircraft. While the total scope of the Combat Evaluation included weapons, radio and sensor upgrades, the glue holding the effort together would be a SOF-unique software line for the MQ-9 developed and maintained under contracts managed by the government team and executed by a dedicated cross-functional team at General Atomics-Aeronautical Systems, Inc. (GA-ASI). Because of the encompassing nature of software running on the aircraft and ground control station, the software development program and associated contract were also referred to as LOH. Given the choice in numbering SOCOM's MQ-9 OFP, engineers with GA-ASI designated this new software line as the "2400 series" to distinguish it from ACC's "900 series." This was a reference to Major League Baseball Hall of Famer Ricky Henderson, the greatest lead-off hitter of all time.

SOCOM's expectations for frequent releases required a new approach. The legacy software development program, following a traditional waterfall development strategy, started with a fixed set of performance and testing requirements as defined in the contract Statement of Work (SOW). These requirements could only change through contractual modifications requiring additional funding, schedule and management approvals. The initial LOH program manager was familiar with service-type contracts supporting software updates for aircraft training systems and sought to implement the same approach in a weapons system OFP development contract. She directed the engineering team to develop a repeatable process and a SOW that would support it.

Crafting this process began with the assumption that software development primarily would be schedule-driven and only capabilities that could be developed, integrated and tested in a given time would be considered for inclusion in each release. Development cycles were set at 12 months, with half of the schedule dedicated to code development and the other half to testing. Releases would overlap each other, resulting in releases to the field every 6 months. Multiple demonstrations of working code in a Software Integration Lab with AFSOC staff and aircrew were planned during development to refine performance requirements with program office engineers in attendance to limit feature creep.

During initial government reviews of the SOW, the procuring contracting officer (PCO) expressed concerns that the contract deliverables were not defined sufficiently and that the contract could be interpreted as a "blank check." To address these concerns, performance metrics were introduced—such as planned hours versus actual hours, and the percentage of test points completed in the first pass. (Later SOWs removed contractual ties to these metrics due to Air Force contracting policy changes and the contractor's demonstrated performance.) The PCO also determined that the contract was for a supply and that individual releases weren't considered deliverables. A high-level depiction loosely based on the planned and actual development schedules during execution of the LOH program is shown in Tables 1a and 1b.

The contractor management team realized early on that a schedule dependency was required to continuously employ a single dedicated team. Specifically, you could not enter the test planning of one OFP until you finished test execution of the prior OFP. This would then determine how soon the team could start the requirements definition phase. Another realization was that a single software release could span two contracts as depicted by OFP 4 in Table 1a and OFP 5 in Table 1b. This was acceptable to the program office since the same contractor team would bridge both contracts. As long as the second contract was awarded and contractor charge lines were established in time, there would be no breaks in the program. During the execution phase, the LOH contract was flexible in handling deviations to the plan, as depicted in Table 1b.

In our program, OFP 1 development began under a separate contract, and coding and testing times were reduced. During OFP 3 flight testing, critical software deficiencies

Tables 1a and 1b. Lead-Off Hitter (LOH) Planned and Actual Schedules

Planned	Year 1											Year 2											Year 3											Year 4										
SW Ver	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
OFP 1	Develop					Test																																								
OFP 2						Develop							Test																																		
OFP 3													Develop					Test																												
OFP 4																		Develop							Test																					
OFP 5																									Develop							Test													
OFP 6																																Develop							Test						
OFP 7																																							Develop						Test			
	Contract 1																								Contract 2																					

Actual	Year 1											Year 2											Year 3											Year 4										
SW Ver	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
OFP 1	Dev		Test																																											
OFP 2	Develop				Test																																									
OFP 3			Develop				Test																																							
OFP 3.1													Develop				Test																													
OFP 4							Develop																		Test																					
OFP 5																		Develop													Test															
OFP 6																															Develop							Test							
OFP 7																																							Develop						Test		
	Contract 1																								Contract 2																					

Develop	Includes Scope Definition, Requirements Development, Coding, Unit Testing, Customer Demonstrations
Test	Includes System Integration Lab, Hardware in the Loop, Ground, and Flight Testing

OFP = Operational Flight Program

Tables by the author

were discovered and an unplanned OFP 3.1 was required. As a result, OFP 4, previously planned as a larger release with a longer timeline, was delayed by 2 months. No contractual action beyond a PCO letter (PCOL) was required to make this programmatic adjustment. Because of the test team's schedule dependency during OFP 4, OFP 5's overall timeline was extended. This offered additional time to work on user requested features that mainly were human-machine interface related in this instance. OFPs 6 and 7 show what could have happened in returning to the previous release cadence if other factors—such as expanding aircraft configurations had not extended development and testing timelines.

Each time the potential arose for scope changes, the customer was offered three courses of action:

- Create a new release for a critical capability or improvement.
- Include the capability to the next release with an associated schedule impact.
- Defer to the following release under the existing scope determination process.

Within 3 years, the team fielded six OFPs, delivering more than 50 system-level customer requirements, more than 500 contractor requests for software changes, and resolving more than 100 test and operational deficiency reports. While no release was delivered on the date that was projected at project inception, slips were measured in days and weeks—not months and years. Capabilities largely met the customer intent with the knowledge that operational feedback could be incorporated in the next or the following release and fielding was likely in a 6- to 12-month period. Therefore, AFSOC accepted less than full compliance with the stated performance goals.

Weekly video teleconferences were held with the user command staff and operational squadrons to provide status updates and discuss possible problem resolutions. Trust was the currency used to keep the program on track and customer expectations in line with the delivered product. The ability of the combined government and contractor team to deliver the desired product directly translated into increased trust on the part of operational commanders in employing the MQ-9 under increasingly

Table 2. LOH Assumptions and Benefits

Assumption	Agile Value(s)	Benefit
6-10 Month OFP Releases	Working Software	Happy customer Minimize capability "hostages"
Level of Effort Type Contract	Responding to Change	Stable funding projections React to req. changes without contract modifications
Integration of Mature Hardware	Working Software	Demonstrated performance attributes Reduced risk of delay
Prioritized Capability List	Customer Collaboration	Most important tasks worked up front Anticipate future design choices Low hanging fruit incorporated during slack time
Multiple software reviews and demonstrations prior to formal test	Customer Collaboration Working Software Individuals and Interactions	Requirement refinement during design Trust in delivering on commitments
Frequent enterprise-level exchanges	Customer Collaboration Individuals and Interactions	Build trust in teams
Informed Customer Risk Acceptance	Customer Collaboration Individuals and Interactions	80% now is better than 100% never
Small Empowered Teams	Individuals and Interactions	Ease/Speed of communication Shared understanding

difficult and strategically important conditions. The Senate Armed Services Committee, in its report for the Fiscal Year 2015 National Defense Authorization Act, commended the team's approach and said: "The committee strongly supports SOCOM's efforts to accelerate fielding of advanced weapons, sensors, and emerging technologies on its fleet of MQ-9 UAVs through the MQ-9 [MALET] program of record utilizing the Lead-Off Hitter rapid acquisition process." Recently, ACC officially directed the program of record to employ the AFSOC OFPs and ended its own separate software development program. The two commands now work closely together on maintaining the speed of the LOH release cycles, delivering the full sustainment tail typical of an ACC program and providing a unified prioritized capability list to the program office to guide future capability investments.

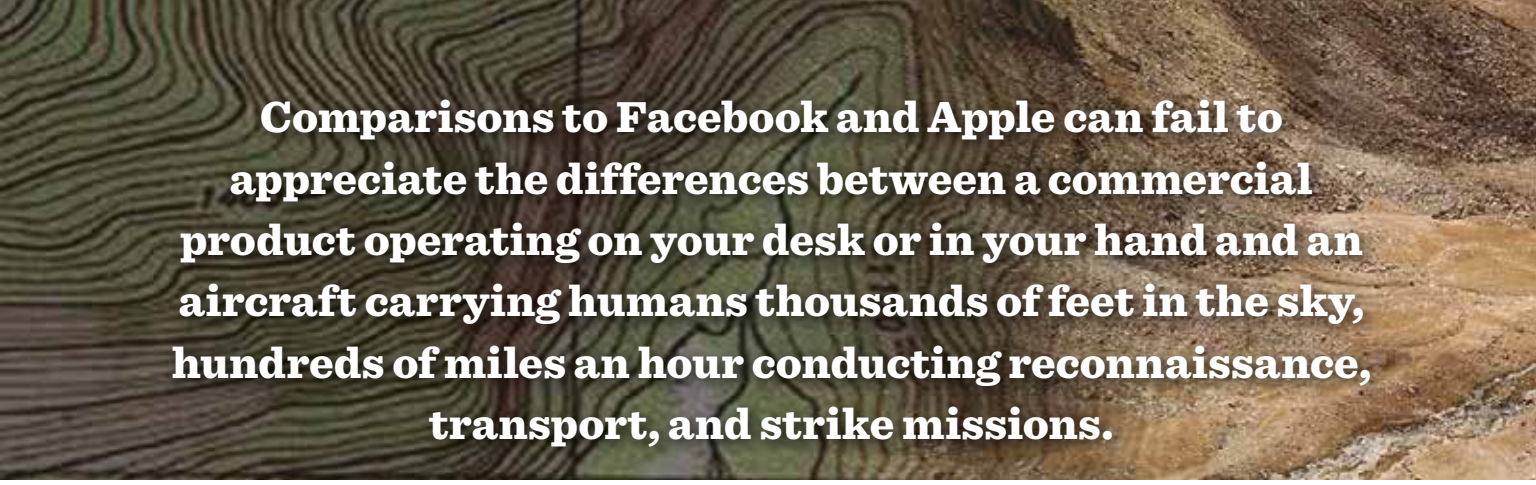
Responding to SOCOM's need to deliver capability quickly and reliably required the MALET team to approach software development acquisition strategy in a different way. Key assumptions mapped to Agile Values and the resulting benefits are listed in Table 2.

Establishing a repeatable process and schedule framework for each release through a series of sequential contracts made our customer happy by increasing the frequency of deliveries over previous release cycles. The "Level of Effort" type contract enabled the team to respond to emerging needs by not contractually locking in technical requirements. Establishing and changing technical content of a particular release was handled via PCOLs rather than by contract modifications.

A dedicated contractor team executing a repeatable process also led to stable funding requirements benefiting SOCOM, predictable workforce planning benefiting the contractor and simplified contract management benefiting the program office. By keeping cost constant, the MALET program manager was able to quantifiably demonstrate the trade-offs between scope size and schedule. Adding capability requirements during development, while highly discouraged, could be accommodated with ripple effects to future release but without the time penalty of a contract modification.

In leveraging mature hardware, our customer based its requirements on demonstrated performance, and the program team reduced the risk of delay due to unforeseen suitability or effectiveness issues. Additionally, by only taking on work that could be accomplished within the given schedule, the program office reduced the risk that one capability would hold up other capabilities within the same release cycle. The dedicated software development team combined with the flexibility in defining performance requirements allowed the contractor to propose numerous maintenance fixes during each release cycle.

From the government's perspective, as long as the delivery schedule wasn't impacted, these proposals were approved and even encouraged. Agreements with the program office sustainment team provided operation and maintenance



Comparisons to Facebook and Apple can fail to appreciate the differences between a commercial product operating on your desk or in your hand and an aircraft carrying humans thousands of feet in the sky, hundreds of miles an hour conducting reconnaissance, transport, and strike missions.

funding to code and test these fixes at the unit level. Funding for LOH research, development, testing and evaluation then paid for integration and testing at the system level. Frequent interactions such as technical interchange meetings to clarify requirements, multiple software demonstrations with aircrew, and flight manual working group meetings built trust between team members crossing many organizational and functional lines.

While Agile principles may sound obvious, our team also benefited from a few critical enablers. First, a high level of experience and expertise was resident in each team member and a high level of trust had been established within the team during earlier SOCOM MQ-9 projects. Second, since the program costs did not exceed a particular threshold, the level of oversight for this program was held at the Program Executive Officer level and acquisition documentation such as the System Engineering Plan and Test and Evaluation Master Plan was reduced. The team was free to tweak the process while executing the program. (The PEO later confessed that he was going to "pull the plug at the first sign of trouble" but was glad that he didn't.) Third, the customer showed great patience and outreach throughout this journey. Participating day-to-day in the development program gave the customer ownership of problems and solutions. Furthermore, the customer advocated for and received general officer approvals for increased operational risk resulting from less-than-perfect designs and technical orders in order to speed fielding of capability.

These assumptions and enablers aren't the only considerations in shifting away from a pure waterfall approach for fielding capabilities. There are natural technical limits that an Agile approach cannot solve (i.e., you can't "Agile" your way past the speed of light). There are organizational, cultural and legal considerations that each acquisition program office must address. Program offices will need properly trained personnel to craft appropriate contractual language. Government and industry teams must work closely to define expectations. Rules of engagement must be established between developers and operators to mitigate scope creep. Major Defense Acquisition Programs with Earned Value Management System reporting, oversight from the Office of the Secretary of Defense, and congressional interest, must garner advocacy and buy-in to earn the trust of senior decision makers to waive or tailor reporting and milestone decision requirements. Program offices should make the effort toward Change Management to ensure a smooth transition when developing and implementing Agile Business Principles. Separating hardware development programs from integration, testing and fielding increases the number of contracts to manage and the potential interdependency of each. This approach may increase program office workload and risk management.

With "Agile" and "agility" becoming acquisition buzzwords, it's important to properly apply the Agile Values and Principles to each individual program. The Agile Manifesto was written by software developers primarily to address information technology platforms using commonly available and standardized computer components and applications. Military aircraft are built to unique, detailed specifications and operated by highly trained aircrew and maintenance personnel. Comparisons to Facebook and Apple can fail to appreciate the differences between a commercial product operating on your desk or in your hand and an aircraft carrying humans thousands of feet in the sky, hundreds of miles an hour in reconnaissance, transport, and strike missions.

Certification authorities and independent test organizations may find it hard to meet their established processes and timelines given the pace of new software releases. Senior leaders responsible for these activities should embrace the Agile principles and challenge their organizations to develop their own practices to meet the need. Concepts such as open architecture and digital thread offer opportunities to review and approve modular designs across multiple platforms, minimizing the costs of system-level assessments.

It is often said that Agile is a team sport. As far as clichés go, this one gets it right. Changes are required from all participants in the acquisition process to reap the benefits of an Agile approach.

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Financial Management's Key Role in **Cybersecurity**

Stephen Speciale ■ Kimberly Kendall

CYBERSECURITY AND ITS ASSOCIATED THREATS ARE INCREASING AT THE SPEED OF LIGHT. THE Department of Defense (DoD) is no exception. Since the DoD is responsible for our nation's defense, cybersecurity will remain a top priority.

How do we effectively deter and defeat cyber threats? We must understand the cybersecurity requirements and risks to our systems and utilize the expertise from all acquisition functional areas. Successful cybersecurity risk management necessitates involvement and contributions from all functional areas, not just those within information technology (IT) and engineering.

An article—"Including Cybersecurity in the Contract Mix," by Kimberly Kendall and William Long—in the March–April 2018 issue of *Defense AT&L* magazine, outlined the importance of contracting personnel and processes for sound cybersecurity management. Let us here focus on the importance of the financial management (FM) community and its associated functions throughout the acquisition process to ensure that we have accounted for cybersecurity. For the purposes of this article, the FM community includes those in cost estimating, budget formulation, budget execution and earned value management (EVM).

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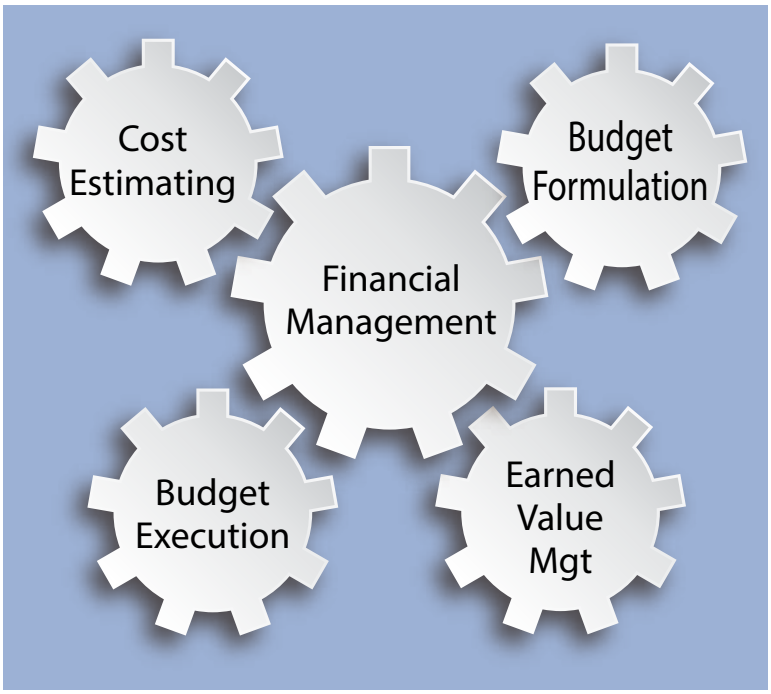
Importance of the FM Community

Everything needed to support DoD acquisition programs requires funding—including personnel, materials, systems and facilities. All requirements have a cost. This includes cybersecurity and its associated cost drivers. DoD's process to determine and allocate funding for requirements is the Planning, Programming, Budgeting and Execution (PPBE) process. *DoD Program Manager's (PM) Guidebook* for Integrating the Cybersecurity Risk Management Framework into the System Acquisition Lifecycle [September 2015]—herein referred to as "*DoD PM's Guidebook*"—states that "cybersecurity resources will require funding through various types of appropriations, since cybersecurity is considered throughout the full life cycle of the program." Acquisition teams must fully utilize the FM community to ensure that programs effectively identify and utilize funding based on cybersecurity requirements and associated cost drivers. Figure 1 outlines the major FM functions throughout the acquisition process where cybersecurity must be considered.

Cost Estimating. Cost estimates link cybersecurity requirements to costs. Estimates are vital not only at program initiation but also for each fiscal year (FY) and for major program milestones throughout the program's life. Cost estimators utilize the program's Cost Analysis Requirements Description (CARD), or equivalent document, to recognize requirements and develop costs using appropriate estimation models and methods. Such estimates are integrated into a program's Acquisition Program Baseline, used to develop program life-cycle cost estimates and as the basis for programs to construct their budget requests for inclusion in the President's Budget submissions to Congress. Program documents containing cybersecurity requirements and associated risk factors are of particular importance for cost estimators to construct estimates. To address the affordability of cybersecurity, cost estimators should have a broad understanding of the unique cybersecurity cost drivers to ensure that applicable elements are identified and included within a program's budget. For instance, if a program has

Figure 1. Major FM Functions



Source: The authors

cybersecurity requirements with rigorous software development, software testing and supply chain risk management activities, cost estimators must understand the requirements and duration for each requirement to develop realistic estimates. Accurate cost estimates form the basis for all other FM functions.

Budget Formulation. These efforts involve transforming program cost estimates into actual budget requests within budget documents. Why are budget documents so important? Programs cannot exist without funding appropriated by Congress and those budget documents are the way programs request their needed funds. Budget formulation, with assistance of acquisition team members, requires identifying cybersecurity requirements and associated amounts needed each FY by appropriation. Those budget documents are reviewed by the Office of the Under Secretary of Defense Comptroller (OUSD[C]) and Congress. Whereas the OUSD(C) supports the DoD and its programs, Congress maintains responsibility for appropriating funds and providing DoD's programs budget authority. The *DoD PM's Guidebook* states that programs should include cybersecurity requirements as an identifiable line with a program's budget. That requirement is critical because budgets must be defendable and written clearly so that the requirements can be understood by stakeholders independent of the program office. If cybersecurity requirements are not properly projected by cost estimators, a program's budget documents likely will not reflect the appropriate requirements or associated funding.

Budget Execution. These efforts revolve around funding execution, once programs receive budget authority, on contracts or other vehicles as specified in program budget documents. They include the creation and maintenance of spend plans per FY and appropriation to demonstrate how the program will use funding appropriated by Congress. Input from other acquisition team members is required to ensure that the plans are accurate, realistic and incorporate all planned program requirements (including cybersecurity). Spending plans may encompass obligations or expenditures and are tracked against actual execution rates. Actual execution rates and comparisons to spend plans are of significant importance for programs since they are a key measurement for evaluating program performance. They not only are tracked by OUSD(C), but also used by Congress when considering future program budget requests. Execution personnel are key contributors for completing program Select and Native Programming Data Input System (SNaP-IT) reports on IT/cybersecurity budgets. The SNaP-IT reports are another requirement for programs to justify their cybersecurity activities and funding amounts since programs must report actual spending and future planned spending. Finally, execution personnel can initiate or complete actions (such as submit unfunded requirements or reprogramming requests) for programs if urgent needs or shortfalls arise, for example, due to emerging cybersecurity threats or vulnerabilities.

EVM. This is a valuable program management tool for evaluating cost, schedule and technical performance on contracts, including cybersecurity. EVM measures past performance, forecasts future performance and incorporates risk factors to support program decisions. Military Standard (MIL-STD) 881D Work Breakdown Structures for Defense Materiel Items (April 9, 2018) emphasizes the importance of cybersecurity and actions that programs should take to better manage cybersecurity requirements. It states that, "Attention must be paid to cybersecurity at all acquisition category levels and all classification levels, including unclassified, throughout the entire life cycle…." MIL-STD-881D provides the structure for programs to identify, measure and report crucial cybersecurity-related costs. It instructs programs to break out specific cybersecurity elements (hardware or software) within the work breakdown structure (WBS)

Table 1. Functional Area Input to Cybersecurity Cost Drivers

Acquisition Function	Cybersecurity Cost Drivers
Program Management	• Cybersecurity personnel staffing • Cybersecurity training for program office personnel • Specialized cybersecurity training/certifications for cybersecurity staff • Executing the Risk Management Framework (RMF), see DoD Instruction 8510.01 • Cybersecurity incident response planning/implementation
Systems Security Engineering Cyber/Information Technology Information/System Owner	• Cybersecurity requirements evaluation • Cyber-attack surface characterization • Interaction with the intelligence community for threat assessments • Conduct trusted systems and networks analysis (including criticality analysis) • Development of the program protection plan (including cybersecurity strategy) • Support on RMF compliance tasks/documents (security assessment plan, etc.) • Develop system-level cybersecurity architecture • Design, develop and implement cybersecurity controls • Develop approaches to mitigate cybersecurity system vulnerabilities • Ensure the design of hardware, operating systems and software applications adequately address cybersecurity requirements for the system • Cybersecurity support to technical reviews • Trade space analysis between security controls, system functional performance requirements, and costs of affordable/risk acceptable mitigations • Cybersecurity configuration management
Test and Evaluation	• Cooperative vulnerability identification • Adversarial cybersecurity developmental test and evaluation • Cooperative vulnerability and penetration assessment • Adversarial assessment • Cybersecurity compliance tracking and reporting • Software assurance (e.g., secure coding testing, vulnerability scanning) • Hardware assurance • Malware scanning, detection and prevention • Cybersecurity test infrastructure planning/usage • Mission-based cyber risk assessments (e.g., cyber table tops)
Contracting	• Cybersecurity requirements and associated risk are considered in determining contract types and incentives (both impact program funding). The Financial Management (FM) team completes cost estimates based on expected contract types, program schedule and funding appropriation. Together, the FM and contracting teams form a contracting strategy that is feasible, affordable and motivates contractor efforts. • Cybersecurity software licenses/services • Costs related to the Federal Acquisition Regulation (FAR) and Defense Federal Acquisition Regulation Supplement (DFARS) —DFARS Clause 252.204-7012, *Safeguarding Covered Defense Information and Cyber Incident Reporting* —DFARS Clause 252.239-7017, *Notice of Supply Chain Risk* • Contract Data Requirements List to support cybersecurity government oversight (e.g., vulnerability scans, vulnerability defect closure) • Data Rights needed to maintain cybersecurity posture of the system
Logistics	• Supply chain risk management • Patch and vulnerability management • RMF reauthorization • Continuous monitoring, periodic security control assessment • Disposal (e.g., media sanitization, destruction)

Source: The authors

where those costs can be easily accounted for. If elements are separated within the WBS, as opposed to being commingled with other program requirements, programs will have enhanced ability to measure actual performance against planned expectations.

Cybersecurity Best Practices —FM Perspective

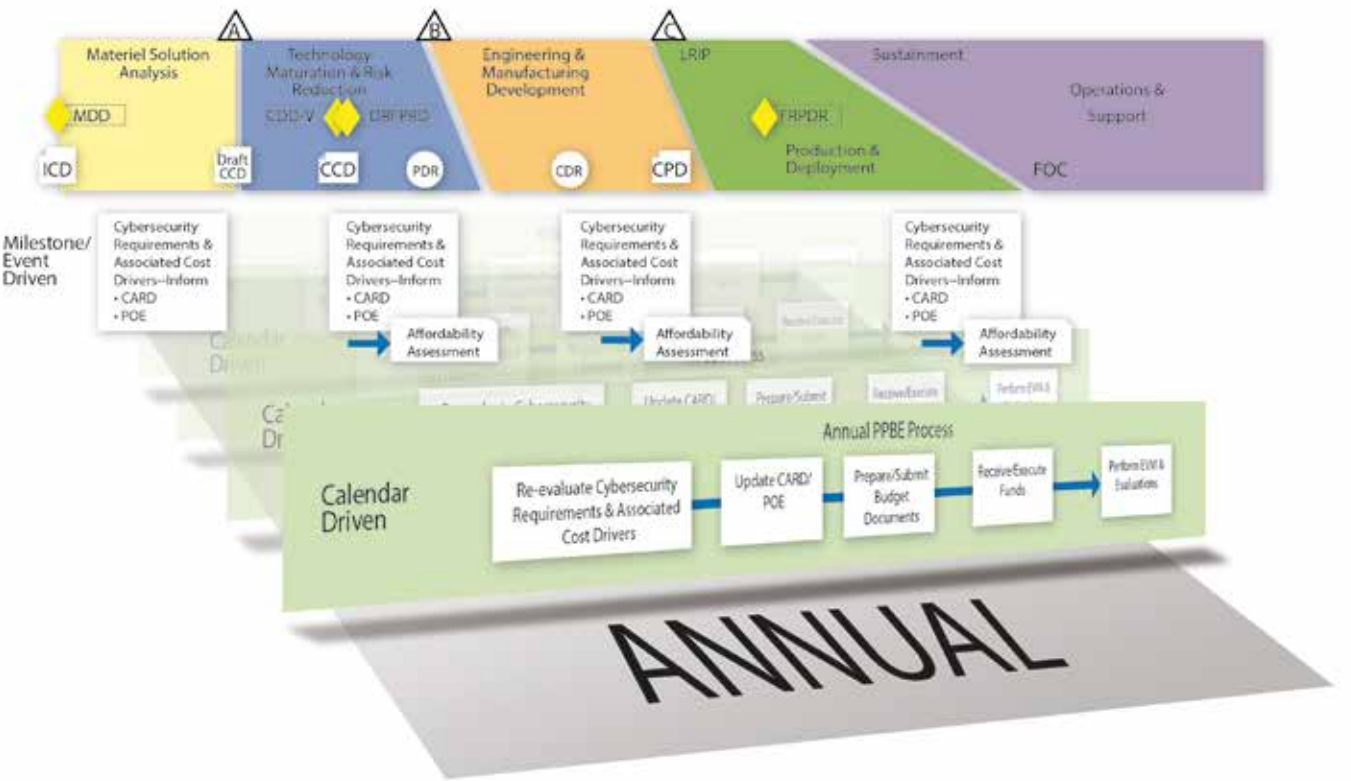
Involve the FM Community. Acquisition programs can better manage resourcing for cybersecurity requirements if they involve the FM community early and often. Not

only should programs proactively evaluate cybersecurity requirements throughout the entire acquisition life-cycle, they should consistently leverage the FM community because of the critical functions its members complete. If FM personnel have no active role or understanding of the requirements and cost drivers, programs risk not having appropriate cost estimates, budgets or effective evaluation capabilities.

Involve All Functions to Identify Cybersecurity Costs. Cybersecurity cost drivers span all acquisition functional areas. Since cybersecurity requirements and risk factors are unique to each program, acquisition teams should consider all potential requirements at program initiation and each milestone with respect to FY and appropriation. FM functions can only be accurately executed from direct interactions with the other acquisition functions. Table 1 outlines the major acquisition functions and potential cybersecurity cost drivers. Many of these cost drivers are derived directly from the *DoD PM's Guidebook* and MIL-STD-881D. This list is provided for illustrative purposes only, as several activities may be shared between acquisition functions.

Effective communication and coordination are required for a successful team-based approach when resourcing cybersecurity requirements. Figure 2 depicts the relationship between the acquisition process (milestone/event driven) and the PPBE process (calendar driven). Cybersecurity requirements and associated cost drivers, like other system requirements, must be included in the CARD and Program Office Estimate and considered throughout the program lifecycle. They shall also be reflected in the PPBE process through budget documents, funds execution/reporting, and evaluation. The durations of life-cycle phases are unique to each acquisition program and determine the number of PPBE cycles executed.

Figure 2. FM Responsibilities Across the Acquisition Life Cycle



Key to Figure: ICD = Initial Capabilities Document; CDD = Capability Development Document; CDD-V = Capability Development Document Validation; CPD = Capability Production Document; CDR = Critical Design Review; DRFPRD = Development Request for Proposals Release Decision; FOC = Full Operational Capability; FRPDR = Full-Rate Production Decision Review; LRIP = Low-Rate Initial Production; MDD = Materiel Development Decision; PDR = Preliminary Design Review; CARD = Cost Analysis Requirements Description; POE = Program Office Estimate; PPBE = Planning, Programming, Budgeting and Execution; EVM = Earned Value Management.

Source: Adapted by the authors from DAU's Cybersecurity and Acquisition Lifecycle Integration Tool

Validate Financial Reporting. Accurate financial reporting is critical for program success and supporting and defending current and future budgets. In an environment with elevated accountability for taxpayer resources and increased congressional interest in the cybersecurity threat, programs must accurately report cybersecurity budgets and requirements (such as spend plans and SNaP-IT reports). All acquisition functional areas play a key role in ensuring cybersecurity is accurately represented in financial reporting activities.

Leverage DAU Resources. DAU continues to assist DoD's acquisition community with integrating cybersecurity into existing processes across the DoD acquisition life cycle. Resources include online tools, courses, articles and specialized training or workshops. DAU's specialized training has helped numerous programs better understand concepts critical to designing and maintaining cyber resilient systems. Also, DAU's Cybersecurity and Acquisition Lifecycle Integration Tool outlines the major cybersecurity activities and interaction with existing processes at each phase of the acquisition life cycle in accordance with DoD Instruction 5000.02, "Operation of the Defense Acquisition System."

FM Community's Cybersecurity Challenges

Several cybersecurity-related challenges exist for the FM community within programs. First, cybersecurity requirements are relatively new and cost drivers are unique to each program. As a result, cybersecurity cost estimates can vary widely. And minimal historical data increases assumptions and application of risk factors. Varying degrees of program complexity with associated cost drivers only further complicate cost estimating activities. For example, developing cybersecurity cost estimates for a legacy defense business system will be vastly different than those of a new missile program. One program may have more critical hardware components or unique software algorithms, require more testing and have a longer program life cycle. Unique cost drivers, risk factors and durations can have potentially large impacts on program cost estimates for individual requirements and life-cycle costs.

Second, emerging or changing cybersecurity threats can drive unexpected requirements changes for programs. Combined with the federal government's calendar-driven budget process for programs to submit budget requests and receive appropriated funding from Congress, programs may encounter undesirable challenges. It can be difficult to define requirements for the current year, let alone several years in the future, as budget requests may not be appropriate from time of request to actual time of use. Challenges will only become more difficult to manage should emerging cybersecurity threats delay schedule due to technical risk mitigation. That also could wreak havoc on program spend plans since they are a key performance-tracking mechanism. For those reasons, it is increasingly vital that programs should involve FM personnel, as they initiate or complete various courses of actions to adjust program funding as requirements change.

Third, it is difficult to measure cybersecurity performance. Whereas typical contract requirements have independent WBS elements, cybersecurity requirements are not always independent elements and are instead embedded within other WBS elements (such as systems engineering, system test and evaluation, and program management). The lack of direct traceability to cybersecurity requirements makes oversight and evaluation functions difficult for programs, specifically the FM community. MIL-STD-881D has provided additional guidance to help programs better measure cybersecurity performance.

Conclusion

The impact and dynamic nature of current and future cybersecurity-related threats on our personnel, systems and facilities cannot be overstated. A proactive and flexible approach to deter and defend against cybersecurity threats must involve all appropriate stakeholders; responsibilities extend to all members of the acquisition workforce, not just IT and engineering. Successful integration of cybersecurity into existing acquisition processes, including FM, is critical to the success of DoD programs. FM community personnel, like those of the contracting community, are critical members of the acquisition team and perform vital functions to ensure program success. DoD will not be able to deliver effective capabilities to the warfighter for defending our homeland and allied nations against threats if we do not adequately fund cybersecurity requirements.

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Feedback, Follow-up and Accountability

Eugene A. Razzetti

THE DEPARTMENT OF DEFENSE (DOD) NEEDS FEEDBACK, FOLLOW-UP AND ACCOUNTABILITY IN ITS acquisition programs so that it can effectively execute its strategic plans. But what do those terms mean, how is each attained and how do we know when they are?

Most people already know The Three Musketeers, and everybody knows the Three Stooges. Both have been the source of unique management approaches for many years. Or at least, it sure looks that way sometimes.

Below are some thoughts and excerpts from a book I wrote titled *Fixes That Last—The Executive's Guide to Fix It or Lose It Management*. It was written for the private sector but has the same applicability to program managers and other DoD acquisition management professionals.

Razzetti *is a retired Navy captain, management consultant, auditor, and military analyst. He is the author of five management books, including "Fixes That Last—The Executive's Guide to Fix It or Lose It Management."*

Feedback

Feedback is communication (in whatever form) that you receive regarding something that your organization plans to do or already has done. It is an indispensable part of the decision-making process—whether in strategic planning or in day-to-day operations. Ideally, feedback means continuous information on performance against accepted standards.

However, before you can expect meaningful feedback, think about the following:

Your feedback requirements should be clearly stated, in writing. Whatever you want done may not get done, if there is no feedback system. Ensure therefore, that feedback mechanisms exist. If there is no established feedback system, you will need to create something, even if it's only temporary.

Feedback is a two-way street; all stakeholders need to know the findings of the feedback process as much as you do, so make sure that they stay informed. Be alert for unexpected obstacles or surprises.

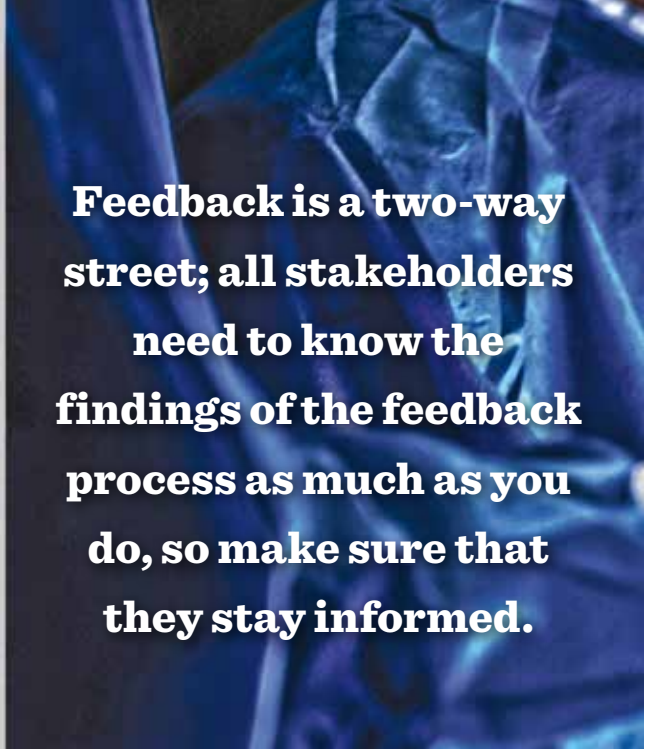
Additionally, feedback, because of its content, may soon become obsolete. You need to get it quickly, and you may have to go out and collect it in person. Personal observation has a history of thousands of years in both management and in the military and is always a good choice. It has been said that, "The greatest fertilizer is the footprint of the overseer."

Meaningful feedback, in whatever form, must flow unimpeded in both directions. Feedback can be formal or informal, written or unwritten. It also may be a combination of all four methods, since it is usually best to document communication about important subjects.

Whenever possible, written feedback should have its own internal documentation and reference authority, to be both credible and useful. Long-term planning suffers when feedback becomes a deluge of unsubstantiated opinions, beliefs and prejudices.

Meaningless feedback includes statements such as I don't like it; it's all messed up; we've never tried it before; or we have tried it (or something like it) before and it didn't work.

Meaningless (and sometimes nasty) feedback with no basis in evidence squanders time, depletes enthusiasm, and can really sabotage your program. You should encourage open (but finite) discussion and dissention. Dissenters should be welcomed, but they need to provide solid, replicable evidence to support their dissention; the more quantifiable, the better.



Similarly, positive feedback should also include hard facts and objectivity. Whenever possible, metrics that characterize both the old and new processes (e.g., gallons of water saved) should be included to better communicate the new process' impact on the organization.

Informal, oral or otherwise unsubstantiated communication and feedback also opens the door to "perception" and causes us to screen or filter what we thought was said, to come up with something partly or entirely wrong.

Requiring a formal and quantifiable feedback process denies people the pleasure of suffering in silence, complaining, or just going with the flow. Mandated feedback also is a guaranteed source of two-way communication. All stakeholders need to know and understand what is going on—and, if they don't, they should ask. If they have it wrong, you need to straighten them out.

Knowing how to communicate, and even being able to do it eloquently, does not guarantee that your message will get across to everyone whom you intend to get it. Obtain feedback in more than one form and from more than one source. Establish multiple communications channels. Personally observe or interact by talking to people to see how the message was received. Determine the sensitivity of those who will receive your message. Lastly, reinforce words with actions or presentations, if necessary.

Measurable Feedback

Decision makers, both military and civilian, need to apply metrics and measures of effectiveness to all areas of their operations, to meaningfully quantify:

- Information collection and dissemination
- Risk, vulnerability and the allocation of limited resources

- Optimal data collection and reporting procedures
- Implementation status of goals and objectives
- Alternative courses of action
- Situational awareness (internal and external)

Subjective and Objective Metrics

Metrics can be either subjective (i.e., conclusions based on observations, experience and judgment) or objective (based on collected data).The tables that follow describe core subjective and objective metrics used to measure the potential effectiveness of operations.

Table 1. Subjective Metrics

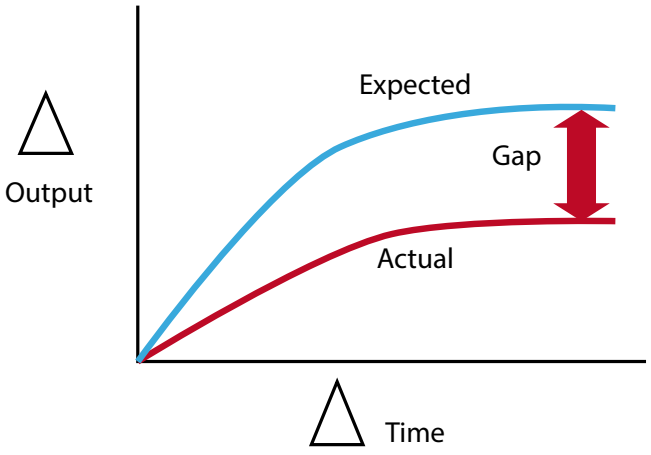
Metric	Desired Movement/ Change
Intelligence collection and dissemination accuracy	Increase
Risk/vulnerability	Decrease
Detection and reporting accuracy	Increase
Connectivity	Increase
Assessment of preparedness	Increase
Mission accomplishment	Increase
Maintainance of situational awareness	Increase
Accuracy of scanning and other electronic sensors	Increase
Weather prediction accuracy	Increase

Table 2. Objective Metrics

Metric	Desired Movement/ Change
Response times (hours)	Decrease
Equipment downtime/time degraded (hours)	Decrease
Speed of movement (miles/hour)	Increase
Throughput (pieces/hour)	Increase
Situational awareness/common operational picture (square miles)	Increase
Commonality/interoperability (instances)	Increase
Unit costs (dollars) Deliver times (hours)	Decrease Decrease
Required training time (hours)	Decrease
Route distances (miles)	Decrease
Decontaminaton time (hours)	Decrease
Personnel casualties (personnel) Extent of operational disruption (days/hours)	Decrease Decrease

Tables and figure by the author

Figure 1. Gap Analysis



Benchmarking and Gap Analysis

Originally, benchmarking meant finding a "best practice" in another organization and comparing it with the same process in your organization. This is not incorrect, and certainly not unnecessary. However, the intent of this paper is to help you get focused within your organization. This is internal benchmarking and is discussed below.

Industrial engineers often conduct variance analyses, or tests for significant differences between several mean values. This is (happily) not what we are talking about. For our purposes, gap analysis is the product of auditing the organization or specific processes (perhaps with the checklists). The analysis provides general indicators and not hard figures. You will be measuring gaps between what is expected and the actual conditions.

The next step after identifying the vulnerabilities is to measure their magnitude against an accepted standard or reference, then determine the "gap" between the desired and the existing. This is gap analysis (Figure 1).

Having identified the gap (and the associated metrics), we can then proceed to the gap analysis, to determine if there is a gap or a difference between what could be reasonably expected and what actually occurs, plus where, specifically, is the gap (i.e., what area or process), what can be done to close the gap, and whether the corrective action is reasonable, cost effective, appropriate, legal, and ethical.

Internal Benchmarking

Internal benchmarking examines your own activities, taking place inside your walls. Areas always ready (and in need of) internal benchmarking include but are not limited to:

- Facilities
- Manufacturing and material handling processes
- Administration

- Training and qualification
- Costs of operations
- Inventory levels and stock turnover
- Waste, work in progress, reject rates
- Other work sites in the same organization (as applicable)
- Purchasing/procurement
- Contracting

External Benchmarking

External benchmarking can include (among other things):

- Customer satisfaction (on-time delivery, reliability/defect reports, etc.)
- Competitors' products
- Recommendations from external consultants and auditors
- Public databases
- Annual reports of other companies
- Government agencies
- ISO (International Organization for Standardization) 9000, ISO 14000, and other international standards
- Tabletop exercises, seminars and workshops

Follow-up

Like feedback, follow-up is vital to an organization's survival and success. It also takes some explaining. The first thing to explain is the difference between feedback and follow-up, and why the two terms are not interchangeable. For our purposes, feedback is needed before and during the implementation, whereas follow-up comes afterward. Both are essential and a valiant attempt to do one does not obviate the need for the other. It is very annoying to find something in the follow-up stage that could have (and should have) been found during the feedback stage.

Follow-up means (among other things) checking on the success or failure of a process implemented, a process changed, an order given, or some other modification done with thought to making something better or, in some way, adding value. For instance, a process modification developed to solve a quality issue on the factory floor, could result in one of the following:

- No measurable change to the product
- Further product degradation (you made it worse, you dope!)
- Improvement, but not enough to justify the added effort or expense
- Significant (measurable) product improvement, in accordance with the modification strategy, and worth the added effort or expense

Some authors discuss follow-up as a one-time process, with an outsider (or team of outsiders) selected to conduct it, and then only after a rigorous selection process. I would suggest that this is not what you are interested in. You most likely will need to do your follow-up internally. Besides being faster and cheaper, it will serve all your purposes, and show the stakeholders that you are capable of identifying and correcting your own problems.

You do need, however, to ensure that your follow-up processes include (at a minimum) the following:

- Comparing the actual performance of the implemented system or process with not only the past, but what was expected
- Verifying that specifications, designs, etc., were fully implemented as planned
- Assessing the possibility of further (i.e., continuous) improvement. The process, however successful or efficient, should never be thought of as "frozen." Rather, it should remain subject to continuous review and improvement.
- Documenting fully the follow-up process thus far and for the future

You also need to know if your people are resisting the changes implemented. Their good reasons can be reflected in subsequent changes to the process.

The ISO 9000 requires that changes to processes be fully documented, and include documentation that follow-up was scheduled and conducted and that the findings were compared with process findings prior to the change. In other words, "Did it do what we wanted or do we need to try something else?"

You change a process to add value to it. It is only by following up that you find out whether the change did any measurable good or in some way added value.

Accountability

Webster defines "accountability" as "having to report to, explain, justify; being responsible, answerable." Early management textbooks and courses routinely linked authority with responsibility, stating that one cannot exist without the other. Unfortunately, accountability was not always included.

Here are basic definitions to help explain the three relative to each other:

- Authority is right of an individual to make the necessary decisions or take the necessary action required to achieve the objectives.
- Responsibility is the obligation for completion of the objectives.
- Accountability is the acceptance of the success or failure to achieve the objectives. It often carries with it positive (e.g., promotion) or negative (e.g., termination) recognition for the success or failure.

Heavy thinkers believe that responsibility and accountability are synonymous, and that separating the two causes unnecessary formality and confusion. They state (not

inappropriately) that accepting responsibility for a project creates an obligation to perform and therefore an implicit answerability or accountability. Another thought is that responsibility does not automatically include accountability, because accountability involves a third party—someone above the responsible manager to whom he or she must give an accounting. Both positions are simple, obvious and too often ignored. I recommend that accountability be considered separately, ensuring that when an objective is assigned, authority, responsibility and accountability are obvious, stated, realistic and measurable.

Accountability, as a separate but related concept, can't be talked about too much, especially in these days of unbridled greed and arrogance seemingly running amok. ENRON, Fannie Mae, Volkswagen, the Department of Veterans Affairs, and Bernie Madoff are names that have scandalized 200 years of responsible management, not to mention 2,000 years of the philosophy of ethics. They underscore the need to hold decision makers and their superiors accountable when predictable catastrophes take place and/or innocent people are hurt.

Most (but not all) people in positions of leadership and responsibility understand their attendant accountability. Ships' captains understand that they are in command but that accountability to higher authority comes with the job and is, as it should be, inescapable.

Accountability of "Teams"

Can the same be said about the accountability of teams and the individual members of those teams? Are they accountable as individuals, or are they safe to do (or not do) whatever they want?

When I was a management student in the early 1960s, "middle management" was both the focus of the training and the prize most sought after. Now, it seems that you have to aim to get on a team, much as a congressman aims to get a good committee assignment.

Middle management, once the backbone of (and launching pad for) an industrious America, is being replaced by teams of every shape and description. Middle managers once were held accountable for the success or failure of their organizations for two excellent reasons: that was how the work got done, and that was also how middle managers got to be top managers.

Today, teams populate the landscape as middle managers are down-sized or marginalized. Consultants come out of the woodwork, cover conference room walls with butcher paper, and "empower" teams by eviscerating managers and management. If you are going this route, good luck. Just be sure that the teams have the same authority, responsibility and accountability that the middle managers had.

I once attended a "cross-functional team" meeting with a (Navy) client, where Churchill-like oratory flowed but little got done because the poor bastard at the head of the table had no authority to task the members, who, in turn, felt no responsibility or accountability for doing what was tasked. It wasn't pretty. Sound familiar?

Summary

Well, there they are: feedback, follow-up and accountability—as simple as I can make them. Whether they resemble the Three Musketeers ("All for One and One for All!") or the Three Stooges ("Spread out!") in your command or program is up to you.

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MDAP/MAIS Program Manager Changes

With the assistance of the Office of the Secretary of Defense, *Defense Acquisition* magazine publishes the names of incoming and outgoing program managers for major defense acquisition programs (MDAPs) and major automated information system (MAIS) programs. This announcement lists recent such leadership changes for both civilian and military program managers.

Navy/Marine Corps

CAPT Steven T. Nassau relieved **Douglas J. Dawson** as program manager for Tactical Airlift Adversary and Support Aircraft (PMA 207) on April 15.

CAPT Christopher J. Hanson relieved **CAPT Michael J. Stevens** as program manager for Virginia Class Submarine/SSN 774 (PMS 450) on April 16.

CAPT Robert G. Johnson was assigned as program manager for Advanced Payloads Program (Signals Intelligence) on June 10.

CAPT Michael K. Kaslik relieved **CAPT Robert D. Porter** as program manager for Adjunct Payloads Program (Space Field Activity) on June 20.

Increasing **Audit** Readiness

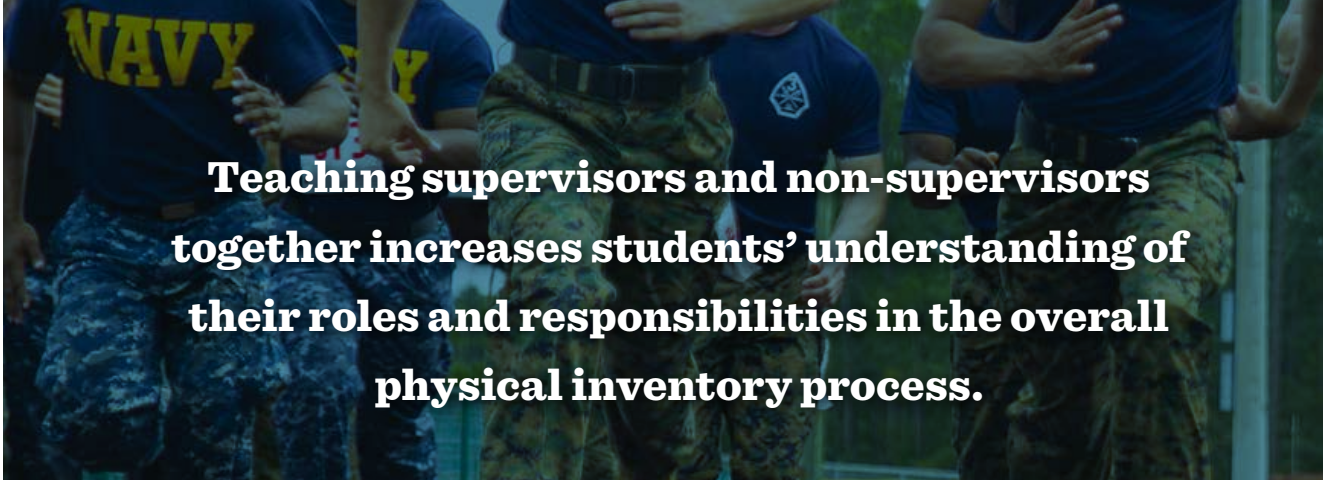
Navy Material Management Training

Laura A. Vancelette ■ *William F. Conroy III, Ed.D.*

A KEY COMPONENT OF AUDIT READINESS IS INVESTMENT IN HUMAN CAPITAL THROUGH WORKforce training. There were lessons learned from the observations and experiences of a Naval Air Systems Command (NAVAIR) National Functional Training Lead (NFTL) who developed and managed related training both during the conversion of Operating Materials and Supplies (OM&S) from legacy material management systems to an approved Accountable Property System of Record (APSR) and into sustainment. Those lessons are examples of best business practices that can be leveraged by other Department of Defense (DoD) components working toward audit readiness.

NAVAIR's best practices include the creation of role-based curriculums, use of gap analysis, compilation of student reference materials and collaboration with other subject-matter experts (SMEs). Both online and offline resources were developed to provide support for and deliver ongoing support to end users after training.

Vancelette *has been the Naval Air Systems Command National Functional Training Lead for Inventory and Warehouse Management for more than 2 years. Since 2010, she has served in several Navy Commands as a Navy Enterprise Resource Planning Subject-Matter Expert in Procurement and Material Management.* **Conroy** *has been assigned to Defense Acquisition University as a professor of Life Cycle Logistics Management and of Production, Quality and Manufacturing since 2005.*



Requirement for Audit Readiness

The Secretary of Defense issued a memo titled "Improving Financial Information and Achieving Audit Readiness" in response to the National Defense Authorization Act (NDAA) of 2010, Section 1003 that said auditable financial statements were necessary to facilitate decision making and to ensure NDAA compliance while informing the public that DoD is a good steward of taxpayer dollars. NAVAIR designated Navy Enterprise Resource Planning (ERP) as the primary APSR for management of NAVAIR's OM&S in October 2014 and directed program managers and accountable property officers (APOs) to ensure compliance. Senior Leadership then stood up the Audit Ready Inventory Team (ARIT) to facilitate and standardize APSR conversion throughout the Command. NFTLs supporting ARIT evaluated existing training constructs and developed new materials and processes to improve training efficacy.

Instructor-Led Training

The first step in the NFTL evaluation process was to review existing instructor-led training (ILT) materials. These consisted of eight role-based training programs covering warehouse management, materiel management, and two methods of conducting physical inventories—each from a supervisory and non-supervisory perspective. Upon completing a role-based ILT course, end-users are granted access to job specific transaction codes and authorized to operate in Navy ERP. The NFTL merged the supervisory and non-supervisory trainings for both physical inventory curriculums. Teaching supervisors and non-supervisors together increases students' understanding of their roles and responsibilities in the overall physical inventory process. End-user certification time was reduced by 2 days as a result of condensing training from eight to six classes. These training packages were compared with those from other Commands to ensure consistency throughout the Department of the Navy. Incorporating audit requirements and new policies produced the first authentic NAVAIR-specific curriculum for Navy ERP material management.

A gap analysis compiled and analyzed a list of more than 180 transaction codes used for inventory and warehouse management in Navy ERP. The analysis was used to determine which transaction codes lacked end-user training material, such as videos or desk guides, and to prioritize the creation of supplemental materials for each transaction code. The gap analysis was also used to identify the appropriate training materials to be included within the ILT curriculum.

Videos and Desk Guides

NFTLs collaborated with a contractor to develop more than 100 videos and desk guides specifically tailored for the NAVAIR material management user community. The videos include open captioning and are intended to be played during end-users transactions in Navy ERP. Videos and desk guides were reviewed and revised by the NAVAIR ERP Business Office and the OM&S Branch (AIR 6.8.3.3) to ensure consistency and policy compliance.

NAVAIR Guidebook

In addition to the videos and desk guides, a guidebook was created to provide the end-user with over-arching, standardized processes across the NAVAIR enterprise. The *NAVAIR Property Guidebook* (NPG) provides Material Managers with a user-friendly reference document for the procurement and management of OM&S. The NFTLs, in collaboration with AIR 6.8.3.3 SMEs, developed and co-authored the "Manage-It-Right" section that includes scenarios covering the management of OM&S materiel from initial receipt to disposal. The NPG, representing current best practices for NAVAIR, is undergoing the final internal review process prior to publication. Once approved for dissemination, the NPG will be made available across the NAVAIR ERP community via a Web-based platform—SharePoint.

SharePoint

SharePoint is the common document management and storage system used by NAVAIR. The NFTL collaborated with the SharePoint Administrator to create the AIR 6.0 Navy ERP Training page that permits users to access training material as needed. It visually incorporates the over-arching business process concepts of the NPG to provide cross-platform consistency. SharePoint provides users with

access via interactive links to ILT course materials, desk guides and unique how-to videos, standard work packages, DoD instructions and NAVAIR policy. SharePoint also will be used to gather usage data and provide a user feedback mechanism regarding the perceived value of the training materials to facilitate future improvements.

Warehouse Management Community Forum

The NFTL created a monthly forum to communicate pertinent issues directly to the material managers. This recurring meeting provides a means to socialize applicable information and create a collaborative network across the enterprise. The monthly forum is a continuous venue to share any roadblocks or success stories from the various sites. Additionally, training updates and products have resulted from recommendations made by the warehouse management community.

Summary

NAVAIR NFTLs are successfully mitigating the risks of the significant structural and cultural changes caused by becoming audit ready. Although much work remains to be accomplished, NAVAIR has made considerable progress toward improving audit readiness by investing in the training and preparation of its workforce. Just as NAVAIR built on lessons learned from previous conversion training, these best practices can be copied and modified for use throughout the DoD to ensure that holistic, student-focused training is the standard, not the exception, and that Congress' audit readiness goals are fully achieved. CAPT Timothy Pfannenstein, AIR 6.0B, put it in perspective when he said, "We are expected to be good stewards of our tax dollars. Achieving audit readiness is not only our obligation to the taxpayer; it is simply the right thing to do."

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Defense AT&L Wins APEX Award of Excellence

Defense AT&L magazine (now *Defense Acquisition*) won an award of Excellence in the field of magazines of more than 32 pages in the 30th annual APEX Competition this year. This marked the magazine's fifth APEX award and its ninth recognition from all awards sources in the last 4 years. The award was received for the January-February 2018 issue.

The award specifically mentions managing editor Benjamin Tyree and art director Tia Gray as well as the production, editorial and graphics staffs of the Defense Acquisition University (DAU) Visual Arts and Press office headed by Randy Weekes. These staff contributors to *Defense AT&L* include Copy Editor and Circulation Manager Debbie Gonzalez; Production Manager Frances Battle; Nina Austin for online support; Noelia Gamboa for administrative support and photography; and Michael Shoemaker for editing support. Collie Johnson adds extra information to the magazine's online site. The competition reportedly received more than 1,400 entries and is sponsored by Communications Concepts, Inc., of Springfield, Virginia. *Defense AT&L* also won APEX awards in 2014, 2015, 2016 and 2017.

Earlier this year, *Defense AT&L* also won a Hermes Creative Gold Award for excellence from the Association of Marketing and Communications Professionals (AMCP) in Dallas, Texas. The awards honor "the messengers and creators of traditional and emerging media." The magazine also received its second award from the National Association of Government Communicators in Falls Church, Virginia (see *Defense AT&L*, July-August 2018, page 47). Last year, *Defense AT&L* received a MarCom Gold Award through AMCP for "marketing and communication achievement," which sounds a positive note on the publication's role in achieving DAU's goal of customer intimacy.

The magazine's strength derives greatly from the expertise of the many acquisition professionals who author its articles. These include DAU professors, Department of Defense officials, and industry suppliers. *Defense AT&L* always provided an excellent venue for exchanging information and lessons learned and for highlighting problems and advances in the acquisition and sustainment processes, and for advancing DAU's mission of training the acquisition workforce. That quality continues with *Defense Acquisition*.

The magazine's sister publication, the *Defense Acquisition Research Journal,* and its editors and illustrators, also won an APEX award for excellence and a platinum Hermes award—further demonstrating the publishing world's growing recognition of the great quality of DAU's products. These publications, again, provide a great opportunity for continuing education outside the classroom.

—Benjamin Tyree, managing editor

The Hidden Costs of **Sundowning** Weapon Systems

James Davis

THE LIFE CYCLE OF A WEAPON SYSTEM IS MUCH LIKE THAT OF A HUMAN LIFE cycle. There is a birth or "introduction"... a very critical time, for sure. We nurture the "baby" and tend to it very carefully. Everyone is excited to see and hold them. We imagine their future and all of the great adventures and accomplishments in front of them. As the baby matures, it grows in strength and intelligence. It becomes productive and takes on a greater and greater share of the overall responsibilities. It is in the prime of life or full operational capability. After that, there is nowhere to go but down.

As with the circle of life, a new generation follows in their footsteps and soon the next generation takes on more and more of the responsibilities. Eventually, our original weapon system heads into sundown and either slowly (or not so slowly) is removed from the fleet. That life cycle has been going on for generations and is nothing new to us. Eventually the weapon systems are disposed of, given to museums or, in some cases, even made into museums.

But did you ever wonder what happens to all of those spare parts that we bought to support the weapon system? Well, pretty much the same thing ... the material is disposed of. It may be sold for scrap or even to a foreign military service. The key point is that we bought or repaired spares that become pretty much worthless after the weapon system is retired. At the same time, we still have to pay for those new spares and repairs. It's not like we can go back to the vendor and say, "Hey, we decided to

Davis *has been assigned to Defense Acquisition University's Mid-Atlantic Region in California, Maryland, as the department chair for Logistics, for the last 5 years. Prior to that, he was a Navy Supply Corps Officer with sub-specialties in logistics and finance.*

stop flying the F-14 aircraft so we would like you to take back the spare parts we bought from you and give us our money back."

So, then, who financed those parts that were disposed of? Some of you are already jumping ahead and saying out loud, "It's the Working Capital Funds." And, for the most part, you would be right. But you would be right only because I said "financed" and not funded. As many of you know, a working capital fund is a revolving account which buys and sells material to an appropriated account customer. One of the "big" customers is the Operations and Maintenance (O&M) account. In the F-14 example, this would be the Navy's O&M account or O&M,N. The point is that the working capital fund finances the procurements and repairs, and the appropriated accounts (i.e. O&M,N) fund the procurements and repairs. Again, this is done through this buyer-seller relationship.

The Costs of New Weapon Systems

Let's start with the "bottom-line up front." There is going to be waste … perfectly good parts that we throw out because we no longer deploy the weapon system they support. Students of Lean manufacturing processes know that inventory is one of the seven categories of waste. Apple Inc. Chief Executive Officer Tim Cook goes so far as to say that "Inventory is evil." While that might be an extreme position, no one likes waste. That said, we don't like the alternative of not having the part when we need it. So the bottom line is that we have this necessary waste and someone has to pay the bill and that someone must have a checkbook. This second part, the checkbook, is where new programs come into the picture. In a perfect world, the program that generated the bill for spare parts would pay for the spare parts. In the case of an aircraft, this bill would be reflected in the cost per flying hour for this platform. And while the working capital funds try to accomplish this, they don't have crystal balls and ultimately wind up with bills to pay for customers that no longer have funding lines associated with them.

That is where new programs come in. Well, I shouldn't limit this to new programs as all other, similar customers who still have a checkbook get to help pay the bill. Once you understand the basic premise that working capital funds can't make a profit or sustain a loss, then it is easier to understand that the costs incurred for the parts that are disposed of must be paid for by programs that are still viable and still have "checkbooks." Sure, the bill ultimately rolls up to the military Service components. But we manage this by individual weapon systems. And in order to maintain working capital funds, we spread these costs into the price that current customers are

Students of Lean manufacturing processes know that inventory is one of the seven categories of waste. Apple Inc. Chief Executive Officer Tim Cook goes so far as to say that "Inventory is evil."

charged for their material. To take this one step further, the larger customers with the biggest checkbooks will pay the greatest portion of the financial obsolescence costs.

Now before we get too excited about this and start cursing working capital funds, we must recognize that this is how the system works. We have working capital funds in order to finance lead time and ensure readiness. This readiness benefit, like everything else, comes with a price. What you can challenge is the way we allocate those costs and the potential negative impacts there can be on our programs. The pressure to contain O&M costs has led several programs to look for ways to "opt out" of the traditional supply chain of the Department of Defense (DoD). The weapon system prime vendors are happy to work with a maturing customer to meet their supply chain needs and will build a business case that shows their alternative costing less than traditional DoD support.

The prime vendors aren't using smoke and mirrors to show the savings and don't have to. They are pricing out a viable program that has a fairly stable and robust demand pattern. They aren't dealing with the outliers and have very little concern about inventory waste. Think of it as being like the health insurance business. If all my customers were in their 20s with few or no health concerns, then my costs would be much less than if my customer base ran the gamut from newborn to elderly with myriad health issues. But if programs opt out of the traditional DoD supply system, the result is a suboptimized environment where a particular program or two might seem less costly but overall DoD costs increase and we all become less efficient.

An Alternative Approach

Great, here I am managing a weapon system in the prime of its life and you're telling me I have to cover the costs of less viable systems for the good of the overall system. As things now stand, the answer is yes. And, it's not just the bills associated with sundowning programs. New starts require investments in wholesale inventories that will also drive up a bill. While some of the initial outfitting costs are specifically identified to the new weapon system and accounted for in the procurement accounts, the costs associated with the wholesale inventory pipeline are financed by the working capital fund and passed along to the appropriated fund customers. In the long term, these costs should be recouped through sales to those programs. But in the short term, someone has to cover the initial investments and that someone is the current customers.

But, there is an alternative. We need only look back in history to see how services developed initiatives to help capture a program's total ownership costs. The Navy's Fiscal Year (FY) 2002 budget submission included an initiative for "Inventory Augmentation." The funding request was for a direct appropriation into the working capital fund (NWCF-Supply Management) to cover the cost of wholesale inventory for weapon systems entering service. To quote the Navy's budget submission:

> ... this budget submission reflects a significant requirement associated with new systems and reintroduces the Inventory Augmentation concept developed and employed during the force-building era of the 1980s. The primary purpose of the augmentation is to procure wholesale inventory in time to support new program readiness while not creating a Cost Recovery Rate (CRR) burden or negative impact to NWCF cash balances. The augmentation clearly identifies and specifically funds the wholesale stock associated with new weapon systems. Furthermore, it supports the direction upon which the 1980's concept was developed—the total ownership cost (TOC) doctrine of full cost visibility.

As the request points out, it was not a new concept and had precedence as far back as the 1980s. This particular effort was to capture the specific costs of new programs and not burden current programs through an increase in CRR. However, nothing would prevent us from applying the same approach for sundowning platforms and using the same logic to capture each program's TOC.

Why Capture Total Ownership Costs?

This goes beyond the simplistic visibility of costs answer. Yes, TOC makes sense when we are making complex, crucial budget decisions and deciding the life or death of our weapon systems. But there is more to it than just the budget decision issue. It goes back to our earlier discussion about opting out of DoD's supply chain and suboptimizing our logistics infrastructure. By isolating these "sundowning" costs, we can develop a more accurate business case analysis for those programs in the prime of life. This will show a more accurate comparison between organic and commercial supply chain alternatives. The bill for the "sundowning" programs still would have to be paid, but those costs would now be visible. I believe our organic supply chain organizations are committed to providing the best balance between cost and readiness and are up to the challenge of managing DoD's supply chains.

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Smart Shutdown Program Support

Community of Practice

Mark W. Unger ■ Don Riley ■ John Adams

YOU ARE THE PROGRAM MANAGER (PM) FOR A NATIONAL DEFENSE PROGRAM. YOU JUST received from the acquisition executive an Acquisition Decision Memorandum (ADM) terminating the program. The ADM states that you have 9 to 12 months to close out the program office. It also directs you to brief the acquisition executive within 30 days on the path forward. Now what? How do you transition and shutdown a program effectively and efficiently?

This occurs more often than one might think. It is not always a program. It could be a rapid prototype technology demonstrator, a component of a system-of-systems program, a training device, or a system whose time has gone. What do you do with the technology? What about the facilities, special equipment or tools and any residual parts? More importantly, how will you manage the transition of the personnel? Program managers (PMs) must consider all of these questions and more to develop an efficient and effective strategy for transitioning the program assets and maximizing Department of Defense (DoD) benefits.

During times of fiscal constraints, our leadership looks for ways to effectively and efficiently manage resources available to the DoD's acquisition programs. One way is to cancel a program and distribute the resources to other programs.

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DoD has canceled a number of programs due to budget constraints, such as the Comanche helicopter (Army); Crusader self-propelled howitzer (Army); Expeditionary Combat Support System (ECSS) (Air Force); Expeditionary Fighting Vehicle (EFV) (Marines); Non-Line of Sight Launch System (NLOS-LS) (Army/Navy); surface-to-air missile Medium Extended Air Defense System (MEADS) (United States/Germany/Italy;) (Army); and the Global Combat Support System (GCSS)(Air Force).

The situation in the first paragraph prompted a discussion about program transitions or terminations amongst several

acquisition professionals at the Defense Acquisition University (DAU). The DoD and the military Services provide plenty of guidance on establishing, executing and supporting programs. The acquisition workforce must comply with the various directives, instructions, regulations, pamphlets and guidebooks of the complex acquisition activities. These activities include developing acquisition master plans, strategies, budgets integrated master schedules, test plans and other strategies to monitor and track program progress in terms of cost, schedule and performance. Integrating these activities helps to ensure a program's success. However, little guidance is provided on how to transition a canceled program.

The outcome of the discussion established a Smart Shutdown Program Support (SSPS) Team of DAU professors of Adams, Riley and Unger. Our champion for this effort was the Late Honorable Claude M. Bolton, Jr.

"I wish such processes [Smart Shutdown] had existed when I was an Air Force PEO [program executive officer] and later as the Army's Acquisition Executive where I had to terminate over 70 programs and their associated contracts," Bolton, a former Air Force PEO and Army Acquisition Executive, said. "Once terminated, these programs required significant time and effort to accomplish the shutdown to ensure it was done in the best interest of the warfighter, the DoD and the taxpayer." This reinforced the fact that neither the DoD nor the Services have formal transition processes to guide PMs on how to shut down a program.

The Government Accountability Office (GAO) also reported on the lack of guidance or assistance for PMs in effectively managing a program shutdown and transition. The PM (or designee) was left to his or her own discretion as to what to do, whom to notify, and how to coordinate all of the impacts. GAO highlighted this in GAO report (14-77); *Canceled DOD Programs: DOD Needs to Better Use Available Guidance and Manage Reusable Assets,* published March 27, 2014. This would later encourage Frank Kendall—then the Under Secretary of Defense for Acquisition, Technology, and Logistics—to issue an Oct. 7, 2014, memorandum highlighting our *Smart Shutdown Guidebook*. In that same memo, he encouraged program management personnel to take advantage of DAU's mission assistance capabilities.

Given that there was little guidance on shutting down a program, the SSPS Team established a path forward in an effort to expand the pool of knowledge. The efforts primarily focused on collecting and processing lessons learned from past transitions, shutdowns and terminations. Our team accomplished this by interviewing workforce members who were (or had been) executing a program shutdown and through having open discussions with senior acquisition leadership at the Service level.

The team began with a question, "What are the things to consider and coordinate in order to properly shutdown the program [office]?" Additional top-level and thought-provoking questions were:

- How do you begin?
- What worked well?
- What did not work well?
- What are the implications or considerations of shutting down the effort?
- What is my timeline?
- What resources will be available to accomplish the shutdown?
- How do you manage the personnel?

Asking these questions (and others) of our senior leaders prompted responses that indicated there was a lack of guidance and/or processes for program shutdowns. Here are some of their comments:

- "There is no process in place to terminate programs. There is a lot of talk but no set or adjustable process.

Nobody had a plan even after they were told of the possibility of their program termination."
- "There were no tools available to assist in shutting down the program."
- "There were no tools for shutdown or combining of programs I could find."
- "There is no process in place to terminate programs."

As the team then compiled and analyzed the data, we realized that our next challenge was to make lessons learned available to the acquisition workforce. Initially, the plan was to host the consolidated data on a DAU server accessible to the acquisition workforce. As an end state, we created Smart Shutdown Community of Practice (SS COP) where a repository of all of this information is available. The best part of the COP is that workforce members can share their experiences with others who are challenged to shut down a program. Every program that transitions, shuts down or is terminated will have its own unique strategy. The COP enables PMs to tailor their shutdown efforts as they learn from others' lessons learned.

A key document on the SS COP is the *Smart Shutdown Primer,* which provides insight into shutting down a program. Initially, it was published as a guidebook that focused on six areas (considerations) when transitioning a program. The focus areas are: Personnel; Capabilities and Requirements; Technologies; Facilities, Contract(s); and Budget and Financial Management realignment. The *Primer* provides a framework for an effective and efficient transition or shutdown due to cancellation.

Additional assets hosted on the COP will assist the project/program management office with considerations in a number of areas impacted when a program must shut down. The DAU SS COP (formally known in the Acquisition Community Connection [ACC] as the SSPS Special Interest Area [SSPS SIA]) is a repository of the senior leader interviews, lessons learned, strawman plans and schedules as well as examples of status briefs and other tools for assisting program management personnel in this endeavor.

Information from our efforts is getting into the acquisition body of knowledge. In order to reach out to our workforce, the SSPS Team also interviewed personnel in defense-oriented publications and through the GAO, and the Federal News Radio Network; Smart Shutdown was embedded in a facilitated case study for the PMT 401 (Program Manager's Course) students and we have provided an elective on Smart Shutdown. Lunch and Learn sessions on Smart Shutdown were conducted and programs invited us to their shutdown planning teleconferences to assist in developing shutdown transition strategies. We also facilitated workshops with program offices in order to provide assistance as they prepared for their shutdown efforts—a standing offer to any interested organization.

The SSPS COP feedback has been incredibly positive. Several programs directed to the SSPS COP found it to be a self-help or one-stop shop as they began their planning. Others that were just transitioning or consolidating found the information on the SSPS COP helpful. This article is yet another way to provide the workforce with tools and opportunities for better acquisition outcomes.

In today's fiscally constrained environment, the acquisition leadership must make hard decisions and accept the risk of canceling programs. The workforce needs additional guidance on what to consider when shutting down programs effectively and efficiently. If a program is shut down with forethought, the impact can be minimized while providing support to other ongoing acquisition programs. A few examples:

- The technology developed in the Crusader program was reused on the NLOS-Cannon.
  The NLOS-LS was careful to collect and store system components for future reuse, which turned out to be a mobile launcher capable of launching various configurations of missiles.
- Technologies from the Comanche helicopter program were transitioned to other Army aviation platforms.

The SS COP can be an effective way of supporting objectives established by our senior leadership.

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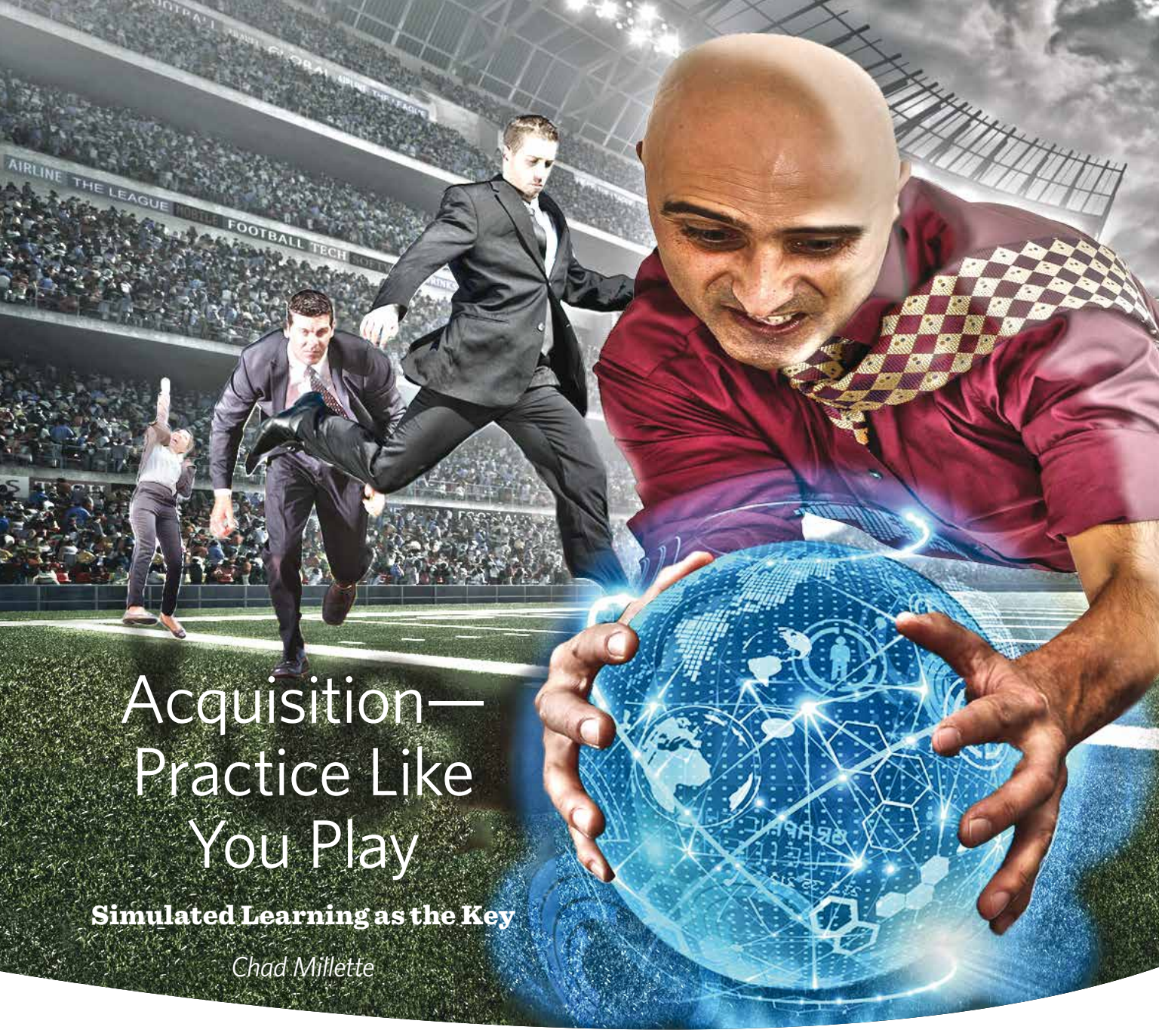

Acquisition—Practice Like You Play

Simulated Learning as the Key

Chad Millette

FOR NEARLY 20 YEARS, I HAVE WORKED IN AND BEEN INVOLVED WITH AIR FORCE ACQUISITION program offices—first as an active duty program manager (PM) and in recent years as an instructor at the Air Force Institute of Technology (AFIT) teaching civilian and active duty Air Force PMs intermediate project management skills.

Through the years, I have uncovered what I think is a major disconnect in how we train acquisition PMs versus how we train others in initial skills. Let's look at two training situations—one sports and one military related—as metaphors that I believe lend credence to the thought that needed training is missing and how to fill the gaps.

The first metaphor is football training. When a team is training their players to successfully execute the mission of a football team—to win football games—a standard process is followed. First, players are taught the fundamentals of blocking and tackling. In fact, often the term "blocking and tackling" is used to refer to the fundamentals of any process. In addition to blocking and tackling, other fundamental skills football players learn are related to their specific positions (for example,

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running backs and receivers learn how to run pass routes and catch the ball correctly). The coaches make sure players are able to successfully employ techniques first established years ago and improved over the nearly century and a half in which football was been played.

Once these fundamentals are set, coaches begin teaching their players how to block and tackle within the team's system, its offensive and defensive schemes. How do coaches make sure players understand and can implement the team's scheme? They practice it. Drills have evolved over the decades in which the players block and tackle in a way that supports running the plays the coaches want to run to implement the team's scheme. After several practices, the team almost is ready to play a game, but football teams take another step: They scrimmage.

In a scrimmage game, two teams play each other in a controlled environment that simulates a real game situation as closely as possible. In practice, the players block and tackle each other and are not (necessarily) trying to beat each other; in a scrimmage, the team plays against another team altogether. This second team is unfamiliar with first team's game plan and is trying to beat that team. The benefit is that the team can lose in a situation that involves only learning. The team learns a great deal in attempting to execute against an opponent the scheme they have been practicing. They can even learn that their scheme or plan won't work.

After trying to implement the scheme against a real opponent and weeks of practicing the fundamentals, the team is ready to take on another team in an actual competition. Each player understands how to do his job. Team members understand how to perform an assigned job as part of the greater team in executing the team's offensive or defensive philosophy. They've practiced the techniques over and over. And they have tried to employ those techniques in as real a situation as possible. By the time the team members are asked to execute in a game that matters, they have

been adequately prepared following a tried and true training methodology.

Another tried and true training methodology is how the Air Force trains pilots. Air Force pilots are first taught the basics—the "blocking and tackling" of flying airplanes; with apologies to my aviator colleagues, this is the "stick goes forward, houses get bigger; stick goes back, houses get smaller" type training. Obviously, flying airplanes is more involved than that. Pilots train in a subsonic airplane under the watchful eye of a pilot trainer until the trainees demonstrate enough command of the fundamentals to fly the plane solo.

Having demonstrated that they know how to fly airplanes, Air Force pilots then learn how to fly the specific airplane they will be assigned. Some pilots fly fighter planes, some fly cargo or mobility aircraft or other specific types. For example, after their initial pilot training, F-16 pilots would go to a base to build on the basic flying principles and techniques they've acquired by learning how to fly the F-16s. They would employ these techniques in the application of the F-16 as a weapon system.

When sent to their first operational units, the pilots learn how to fly the F-16 as their Squadron does in typical, actual missions. They get better—as football players do—through practice. Nearly every sortie flown stateside is a training exercise for the pilot to practice in order to be ready for the real thing. As in football, pilots scrimmage before they execute real-world missions.

Air Force pilot scrimmages are full-blown exercises—and perhaps the biggest and most well-known is the Red Flag exercise. Red Flag organizers say that they would like the exercise to approximate real air combat so that pilots will have flown their first five combat missions before they ever face a real combat situation. Red Flag is intended to be as realistic as possible—pilots are going against pilots and systems that are trying to defeat them. Again, the only consequence of losing in this scenario is learning. Pilots learn which techniques work and which don't work against realistic opponents.

Football players and pilots follow similar training paths on their way to executing the real mission. They learn the fundamentals of their activity—the "blocking and tackling" skills and techniques that are required to succeed. Then they learn how to implement these fundamental skills in the way that their team plans to operate in order to succeed. This training is reinforced with practice, practice, practice. Finally, before being sent to the real thing, they go against an opponent in as realistic a contest as possible. This training regimen gives football players and pilots what they need for their coaches and commanders to be reasonably confident of their success in real games and missions.

Through these training exercises, football players and pilots gain experiential learning. The benefit of experiential learning is that the lessons stick with the student.

I started my career as an intelligence officer. We had a culminating exercise at the end of our initial skills training course. During the exercise, we played roles—employing the tools and techniques we had been taught throughout the course—in a realistic scenario. A more senior classmate played the role of the Intelligence Flight Commander, and a course instructor played the role of the Operations Squadron Commander. My role was to rapidly assess the "flash" message traffic we received (the instructors would inject flash messages by sending a document to a specific printer). Shortly after the exercise began, I received a flash message that a fire was raging on one of our ships off the coast. My classmate and the instructor played their roles. I briefed them that about the shipboard fire and the fact that we didn't know the numbers of casualties or injuries. The instructor asked me if I knew who attacked us. I replied that we didn't know who attacked us but were expecting more information shortly. "But, we were attacked," he said again, inquisitively. I said, "Yessir."

We then went back and forth about the rules of engagement when under attack and our appropriate response—to launch cruise missiles. The instructor leaned back and looked off to the back of the room and yelled, "Launch the cruise missiles." My classmates and I were excited because now we were going into the crux of the conflict that the exercise was built around. After a flurry of activity, everyone went back to work.

Then, the flash message traffic printer spooled up again.

I read the message, and my classmates and the instructor reassembled at the table awaiting my briefing. My heart sank. I briefed them, "sirs, it appears the fire on our ship was caused when one of our ammunition handlers mishandled a fuse causing a small explosion. The crew has gotten the fire under control and there are only minor injuries." Now, remember that I had previously briefed them that there was a fire on our ship. The instructor baited me with the idea that we had been attacked—and I bit and bit hard. The instructor glared at me: "So, you're saying we weren't attacked?!" "No sir, it doesn't appear so," I replied. He said, "Lt. Millette, you just started a war" (the cruise missiles had already been launched). My classmates wide-eyed, thinking, "Man, we liked Chad. I wonder if they will just wash him back to the next class or kick him out altogether." I wondered the same thing.

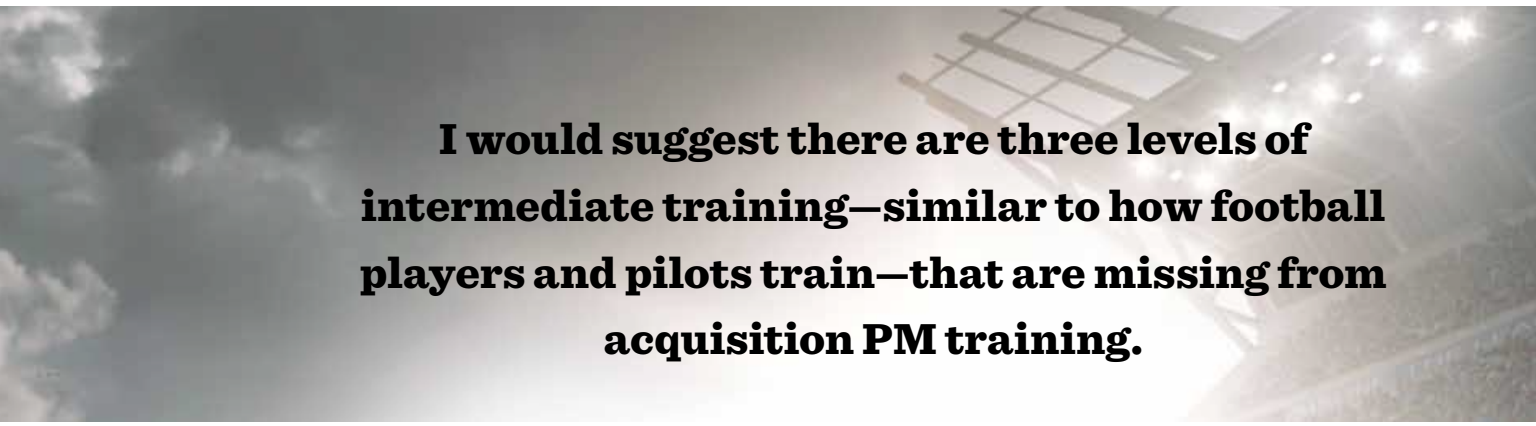
Later, I caught up with the instructor and thought I would rip off the Band-Aid concerning my future. "Boy, I really messed up today, didn't I, sir," I said. The instructor replied, "Yeah, you and the overwhelming majority of the students before you we put in that situation." He went on to explain that the scenario was built such that the the flash message briefer would be likely to jump to the conclusion that we had been attacked. If the student has the wherewithal not to bite, the instructors simply start the conflict a little later in the simulation. I wasn't kicked out, and eventually I graduated.

More to the point, I learned a significant lesson. I learned something because I experienced how it feels to make a mistake by jumping to conclusions.

So what? Well, there were many instances later in my career where I stopped just short of storming the boss' door and took time to make sure that I really knew what was what. In some of these cases, this feeling—instilled in me all the way back in intel school—kept me from jumping to conclusions and reminded me to go back and verify what I thought I already really knew about the situation. Because I had experienced the consequences of this mistake—in an environment intended to train me about what to do and how to do it—I was a better intelligence officer, PM and officer.

Contrast these experiential learning training metaphors with how the Air Force trains acquisition PMs. Air Force PMs start with the fundamentals in the Defense Acquisition University (DAU) ACQ 101 online course and then take the Fundamentals of Acquisition Management course at AFIT. These courses go over the acquisition framework and the basics of acquiring Air Force weapon systems. Then we send them off to a program office to execute and manage real Air Force weapon system projects and programs.

Sure, there is a great deal of continuing education both offered and required to help PMs learn and grow in their field. However, I would suggest there are three levels of intermediate training—similar to how football players and pilots train—that are missing from acquisition PM training. Where is the training to learn how to acquire systems the way my program office does it or for the specific type of weapon system (space, Intelligence, Surveillance and Reconnaissance; electronic warfare; …)? How about the opportunity to practice acquiring weapon systems? And finally, before being cut loose with the responsibility to manage multimillion-dollar programs for real, why not provide our PMs with an opportunity to scrimmage in an "Acquisitions Red Flag" type exercise? I don't have definitive answers to these questions; however, I do have suggestions and recommendations as food for thought for decision makers to consider.



I would suggest there are three levels of intermediate training—similar to how football players and pilots train—that are missing from acquisition PM training.

The acquisition equivalent of learning my aircraft or team's system. This would involve program office-level training. Department of Defense Instruction 5000 (and, for us in the Air Force, Air Force Instruction 63-101) provides policies and processes all acquisition program offices should follow. My experience, however, is that most program offices do things somewhat uniquely. They have tailored the "purple," cross-Service process of the Office of the Secretary of Defense. They have added specific detailed steps to the higher-level guidance. PMs could get training in these tailored processes via a dedicated mentoring program or a training department.

The acquisition equivalent of practicing. This would involve giving PMs the ability to try employing the tools and techniques before they do it for real. Are there "drills" we could create in which a new PM would follow portions of the program office's risk management process? What would it look like if our PMs were not permitted to execute a program office process until they were "checked out" in that process? In the flying world, there are instructor pilots who can give check rides to pilots who are no longer current in their aircraft. What would an acquisition process "check ride" look like?

The acquisition equivalent of a scrimmage or Red Flag. In the Air Force, we used to do this. I can recall that the infrared countermeasure expendables (flares) PMs in August 2001 exercised our ability to respond to a rapid acquisition need. During a base-wide exercise, we were handed a simulated Combat Mission Needs Statement (what we used to call Urgent Operational Needs) and evaluated by the Inspector General on our ability to respond to the need. This was incredibly useful when about 2 months later (after the terrorist attacks of September 11, 2001), we received a real Combat Mission Needs Statement for flares for Air Force Special Operations Command. Having practiced (and learned what worked and didn't work) what we would do in this situation, we could rapidly respond to this urgent need. Ultimately, we were able to go from stating a requirement to having new units come off the production line in only 6 months.

This article was offered in hopes of starting a discussion about improving acquisition program manager training, using as examples football and pilot training to provide insight into what might be done. There already are selected courses in the Air Force and at DAU that use some of these principles. I am suggesting use of simulation and real-life experience in a robust, mandatory and disciplined project-management training course for all PMs.

Training our PMs is not a panacea for acquisition outcomes. In fact, some acquisition folks are annoyed that every acquisition reform study or panel recommends improved training for our PMs. This upsets them for a couple reasons. First, constantly suggesting more training seems to imply that the current crop of acquisition PMs are ineffectual and ill prepared and that this is why we struggle to deliver our weapon systems on time and on budget. We recognize most PMs are well intentioned, well trained, conscientious workers doing the best they can in a system that makes it difficult to succeed. This leads to the second reason my colleagues are leery of a recommendation for additional training—i.e., there are many other areas of the acquisition system that could be improved and that might have a greater impact on our ability to successfully deliver our weapon systems. Recognizing these two criticisms, I still believe that there are benefits to be had by filling these training gaps.

The author can be contacted at **primetimex2@gmail.com**.

Our New Name and New Look

Defense AT&L magazine is now *Defense Acquisition* magazine. Many readers asked when or if our name would change in view of the new name of our departmental division. Now that the dust has settled a bit, the name has been changed. Our art director, Tia Gray, has created a fresh new design to complement the name. We hope that you like our new look.

Publications constantly evolve as circumstances change—but we intend to provide the same, or better, service. Our coverage for the most part will remain as before, with a strong focus on subjects such as procurement, contract and program management, logistics, agility and information technology and security, as well as auditability and accountability. We are as interested as ever in articles about real-life experiences in the acquisition workforce and lessons learned that can be shared for the benefit of all.

We have renamed our bimonthly publication in recognition of the recent reorganization within the Department of Defense. *Defense AT&L* and its publisher, the Defense Acquisition University, formerly fell under the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics. That office was split by Congress into two new offices—that of the Under Secretary of Defense for Acquisition and Sustainment (the Honorable Ellen Lord), under whom we now serve, and of the Under Secretary of Defense for Research and Engineering.

We went for a broad name—since all of our activities ultimately deal with defense acquisition—to keep things as simple as possible. *Defense Acquisition* also is a name with a lasting, generic quality rather than one tied to possibly shifting departmental reorganizations.

So, stay tuned, interested readers. Prospective authors, please keep writing for us and sharing with your colleagues the problems and accomplishments you've experienced in the defense acquisition universe. In this respect, *Defense Acquisition* magazine is an ongoing classroom, and you are the teachers and students of each other.

—Benjamin Tyree, managing editor

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DEFENSE ACQUISITION

Prevention VERSUS Detection

Government Contract Quality Assurance Via a Process

Mark Phillips, Ph.D. ■ *Roger Woods, MSQM*

FEDERAL ACQUISITION REGULATION (FAR) PART 46 DEFINES "GOVERNMENT CONTRACT QUALITY Assurance" (GCQA) as "the various functions, including inspection, performed by the Government to determine whether a contractor has fulfilled the contract obligations pertaining to quality and quantity." At second glance, it may seem strange that inspection is mentioned separately but, historically, inspection is the most common of the "various functions" used to determine whether product meets contract requirements. The type of inspection method is also one of the key parameters a company must predetermine when performing GCQA. What exactly is inspection?

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Inspection, as defined by the American Society for Quality (ASQ), is:

> Measuring, examining, testing and gauging one or more characteristics of a product or service and comparing the results with specified requirements to determine whether conformity is achieved for each characteristic.

This type of traditional inspection is considered "touch" inspection in that the final product is physically examined to determine if it meets the requirement—e.g., specification, blueprint, etc. One disadvantage of this inspection method is that it is most commonly performed after the fact or after the component has been produced. Because of this, you will not know if the product is nonconforming until the end of the process. Inspection performed at the end of the process poses a high risk to quality and schedule. It is labor intensive in requiring dedicated inspection personnel, and, in most cases, it is more costly. In some instances, complex components or large quantity production runs are inspected throughout the manufacturing process to reduce these factors.

As one might expect, when selecting the right inspection method, numerous factors are considered, the biggest being cost. However, managers have to consider several different types of cost, how each type of cost impacts the products and both known and future business decisions. The cost of poor quality (COPQ) can be described as the costs associated with providing poor quality products or services.

The COPQ can be segregated into four categories:
- Internal failure costs associated with defects found before the customer receives the product or service.
- External failure costs associated with defects found after the customer receives the product or service.
- Appraisal costs incurred to determine the degree of conformance to quality requirements.
- Prevention costs incurred to keep failure and appraisal costs to a minimum.

Traditional physical inspection has generally been associated with appraisal cost. Appraisal is expensive because it requires inspectors, inspector training, appraisal equipment and the risk of producing significant quantities of nonconforming material prior to discovering a quality issue.

There's an old saying that "an ounce of prevention is worth a pound of cure." So inserting inspection early in the manufacturing process prevents or reduces the likelihood of nonconforming product and eliminates the need for appraisal and for remembering what FAR 46 states regarding other "various functions" that can be used.

Conceptually, this leads to the quality assurance strategy of prevention versus detection.

The first is the act of preventing nonconforming product and/or services. Detection, on the other hand, involves finding nonconformance that already exists in products and services. A concept often used to contrast the two methodologies states that "designing in quality versus inspecting in quality." The ultimate goal of any quality assurance strategy is to reduce risk, which ultimately reduces cost for all parties involved.

In a Jan. 9. 2017, memo, Frank Kendall, then Under Secretary of Defense for Acquisition, Technology, and Logistics, wrote:

> In Better Buying Power 3.0 I highlighted the need to improve the Department's ability to understand, anticipate, and mitigate technical risks before they become issues, and to recognize and pursue opportunities that may significantly benefit program outcomes.

To this end the *Department of Defense Risk, Issue, and Opportunity Management Guide for Defense Acquisition Programs* states:

> Risk management is not a stand-alone process. It is integral to other program processes, such as requirements development, systems engineering, design, integration, cost estimating, schedule tracking, test and evaluation, EVM [earned value

management], issue management, sustainment, and so on. The government program office, the prime contractor(s), and associated subcontractors should employ a compatible risk management process to facilitate the alignment of risk registers and transfer of data between parties.

The preceding provides a clear indication that the Department of Defense is ready to move to risk management and improved communication as part of the overall quality assurance process. The *Guide* goes on to address manufacturing risk by stating: "Develop an EMD [engineering and manufacturing development] schedule that includes time for integration, interdependency linkages, and mitigation of manufacturing risks."

The *Guide* includes risk mitigation when describing the execution of system engineering (SE) milestone reviews:

These Systems Engineering Technical Reviews (SETRs) are technical milestones to assess the product and processes to ensure the system can perform as desired and proceed into the next phase within cost and schedule constraints at an acceptable level of risk.

Additionally:

The PM should focus the risk management activities on the transition from development to production. The program should consider conducting a manufacturing readiness assessment before Low-Rate Initial Production (LRIP) and again before Full-Rate Production (FRP) to identify risks related to critical manufacturing processes and product characteristics. Examples of specific risk areas include requirements/design stability, integration and interdependency risks, and manufacturing/supply chain quality.

Although the *Guide* speaks to the government, Kendall's Better Buying Power Initiative clearly implores program offices and private industry to join forces when defining risk management processes that include innovative quality assurance tools and techniques.

Naturally, the industrial supply base for goods and services includes both large corporations and smaller family-run businesses, both of which may choose to utilize the International Standard of Organization (ISO) family of standards to provide guidance for managing their manufacturing systems. Achieving ISO-level certification or just utilizing ISO standards for manufacturing and quality system management, would go a long way and is the first start at becoming aligned with Federal Acquisition Regulation and government expectations. The *DoD Risk, Issue, and Opportunity Management Guide* does correlate with ISO 9000:2015 8 *Operational Planning and Control*, as it states:

The organization shall plan, implement and control the processes needed to meet the requirements for the provision of products and services, and to implement the actions determined in Clause 6 by:

- determining the requirements for the products and services;
- establishing criteria for:
  - the processes;
  - the acceptance of products and services;
- determining the resources needed to achieve conformity to the product and service requirements;
- implementing control of the processes in accordance with the criteria;
- determining, maintaining and retaining documented information to the extent necessary:
  - to have confidence that the processes have been carried out as planned;
  - to demonstrate the conformity of products and services to their requirements.

The output of this planning shall be suitable for the organization's operations. The organization shall control planned changes and review the consequences of unintended changes, taking action to mitigate any adverse effects, as necessary. The organization shall ensure that outsourced processes are controlled.

ISO 9001:2015 provides a defined and government-accepted mechanism to move away from detection-based to prevention-based systems. A prevention-based mindset allows the industry to use a more holistic approach to process planning and control, thus installing confidence that the processes have been executed as planned and the individual contractor is initializing systems that are congruent with GCQA best practices.

Prevention-Based GCQA

What do we mean by prevention-based GCQA? As mentioned earlier, risk prevention requires early planning. In using GCQA methodologies that identify risk in a facility or program, and then assigning a risk rating, one can determine where all parties need to focus their collaborative efforts to prevent those same risks from occurring. Inspection at the end of the manufacturing process only identifies the failed product; it does not direct attention or remedy to the root cause of failure. Only by moving up the value stream and getting deeply involved in the manufacture or provision of the goods or service can the cause be determined, thereby reducing or eliminating the risk but incurring substantial appraisal costs.

An example of the best use of risk prevention is in an ammunition facility manufacturing small arms cartridges. The production process moves very fast, producing very large quantities of cartridges; if inspection discovers a defect at the end of the process, there is an alarming potential for

thousands of nonconforming products being manufactured, not to mention the cost of time, money and risk that bad product will make its way to the customer. A good prevention strategy utilizes a process-based approach that promotes improvements and saves the contractor money, a savings that in turn is passed on to the customer. Prevention costs are significantly smaller than those of the traditional appraisal costs.

There are multiple ways to assess or rate risk—collecting and analyzing data is probably the most effective, but that is a topic for another article. Get involved early, influence the contractor to improve the process and only accept products that have been "inspected in accordance with the inspection system and have been found by the Contractor to be in conformity with contract requirements."

Proper stewardship of the public trust means that public employees must always look for ways to do things better. Using a process approach to GCQA moves us from "at the end" detection with the high probability of nonconforming product reaching the customer and toward preventing the defect in the first place. The prevention model provides a mechanism that avoids output of a nonconforming product, thus virtually eliminating risk. In this case, "an ounce of prevention is worth a pound of cure."

It is important to note here the inspection of product for conformity is the responsibility of the contractor, not the government. When the government performs GCQA, it is doing so to ensure that the contractor has met contract requirements, not whether or not the product meets the print.

FAR 52.246-2 states: "The Contractor shall provide and maintain an inspection system acceptable to the Government covering supplies under this contract and shall tender to the Government for acceptance only supplies that have been inspected in accordance with the inspection system and have been found by the Contractor to be in conformity with contract requirements."

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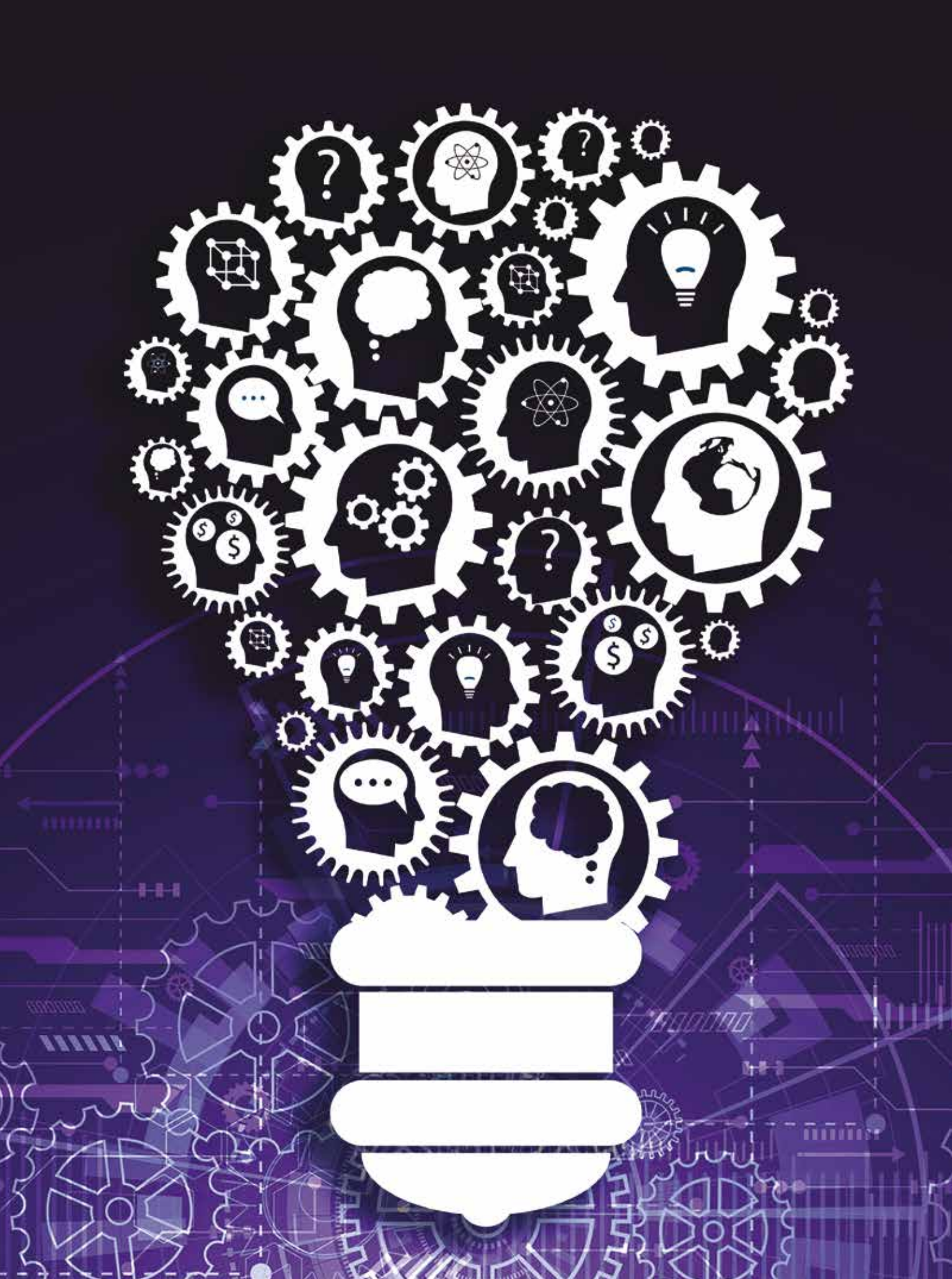

Putting the **T** Back in **IPT**

How to Build More Effective Integrated Product Teams

Angelo Christino

HAVE YOU EVER REFERRED TO ANOTHER MEMBER OF THE Integrated Product Team (IPT) as a teammate? Do you leave IPT meetings with clear direction and a decision made on an important issue? Does your IPT function like a "well-oiled machine"? These are all questions that I asked myself as I began to think about my experiences on IPTs.

First, what is a "team?" The Army Technical Publication 6-22.6, "Army Team Building," defines a team as "any group that functions together to accomplish a mission or perform a collective task. A key to effective teamwork is the cooperative or coordinated effort of individuals acting together as a group or in the interests of a common goal." If this definition doesn't sound like the IPT in which you currently serve, then some team improvement is probably needed.

The IPT process exists to bring together people with varying perspectives and opinions to produce an "integrated product." Because different organizations and views are represented within an IPT, it can be a powerful tool to produce a product that is greater than the sum of its parts. Sometimes, however, the IPT never establishes the teaming aspect of the process. This is not necessarily the fault of any one person or group within the IPT. Often, an IPT culture can be one of incongruence, not collaboration, with the causes ranging from historical biases to budget constraints. However, there are a few basic teaming best practices that can be applied to help put the "team" back into our IPTs.

There is not a "one size fits all" solution for building a high-performing team. Let's explore some of the issues with IPTs based on my experiences and an approach for solving a specific issue, a horizontally aligned narrative. A new approach to the IPT's engagement with senior leaders can help unify the team to a common purpose. Expanding on the Army Requirements Oversight Council concept through using a "Senior Leader Forum" in which every General Officer (GO) or Senior Executive Service (SES) key stakeholder of the IPT is briefed at the same time by the IPT, can help create a real-time shared

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understanding of the issues at hand, how decisions are made and unify the team under a common goal.

What Is the Purpose of Your IPT?

There is a common misconception that any assembly of people in one space is a team. However, to be effective, a team must work together toward a common goal. Consider, for example, a basketball team, which has 12 individual members with five on the court at a time. If each team member has a different goal, such as each one wanting to shoot as many 3-point shots as possible, then the team will ultimately fail. The goal that gels the team is simple: Win the game. To achieve the goal, each teammate should play and make decisions to help the team win.

So, what is the goal of your IPT? If you can't answer this question with certainty, that's OK. Most IPTs never state a goal or a purpose of a team. In the case of the basketball team, however, lacking a clear understanding that the goal is to win each game, every player will decide to pursue individual goals, resulting in chaos on the court. The IPT must similarly know why it exists and what the goal is. How do you know the IPT is accomplishing what is needed? Without any clear purpose, how can an IPT claim victory or "win"?

Admittedly, it would be naive to think that team victory is the sole motivation for each member. Each individual also has personal goals within the team; consequently, something must unite a team around a common purpose. The concept of team of teams includes a shared sense of purpose, or an aligning narrative, as described in the recent work of Chris Fussell's 2017 book *One Mission: How Leaders Build a Team of Teams.*

Is Bureaucracy Blocking Your IPT?

IPTs are considered working-level forums where the chair or other facilitator is required to moderate the debates and provide recommendations from the team to the next higher level. The level of responsibility varies, but generally speaking most IPT members report the information and decisions made within the IPT to their chains of command. This phenomenon is described by Fussell as an "information pump." As the information is "pumped" to the next step in the IPT member's respective bureaucratic structure, there is no "connective tissue" that aligns that message. Senior leaders then discuss that information and may or may not arrive at a shared understanding of the situation.

The current structure of "stovepiping" information into each IPT member's respective organization does not work in today's rapidly changing and interconnected world. Fussell describes networks as the alternative to the structured bureaucratic structures that continue the flow of stale, often disparate, information into our organizations. Networks, unlike bureaucracies, are not objects of pure structure whose properties are fixed in time. They change rapidly, and their connections are in constant motion based on the surrounding conditions. Our traditional IPTs allow networking, but only to the extent permitted by the parent organizations. Interactions and the relationships built among IPT members often are closely controlled and solid-line relationships to senior leaders are strictly hierarchical. Too often IPTs are governed by strict parent organization rules that don't allow open sharing of information within the IPT and up the solid-line hierarchy of senior leaders. The problem of integrating potentially divergent organizational objectives into the broader IPT narrative can be addressed through networks.

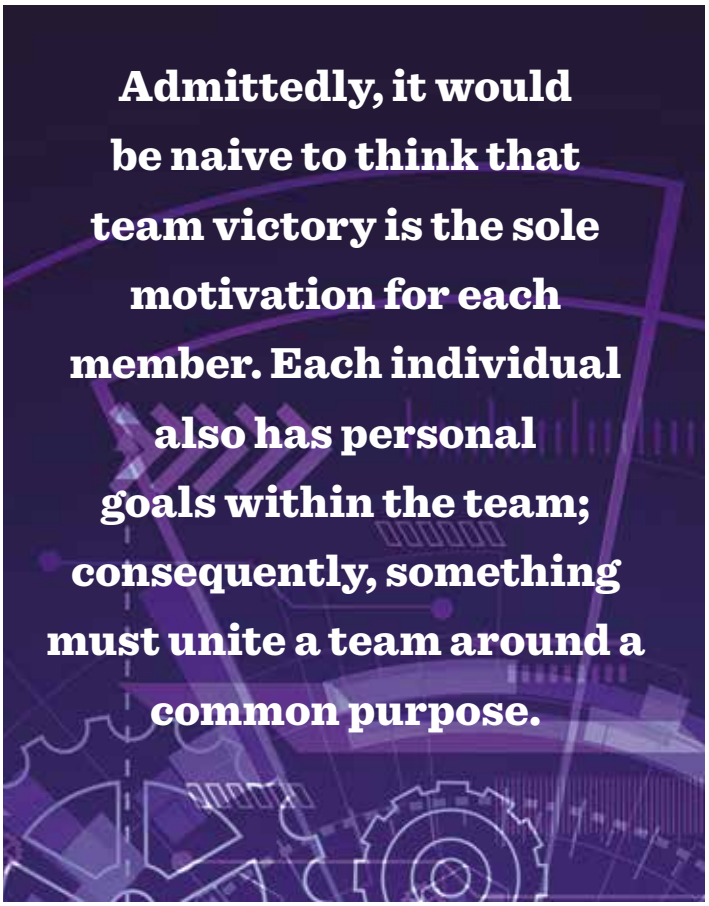
It sounds like building a network is the answer to our IPT woes, right? Well, not so fast. In a purely networked organization, there is a tendency to be narrative driven—meaning each networked team has its own aligning narrative and is disconnected from the "big picture" of the larger organization. Where pure networks fail, we may be able to use some of the positives from a bureaucratic approach. You may be thinking that bureaucracies are bad. But it depends. Much like a pure network, a pure bureaucratic structure leads to issues, and many of those are highlighted in this article. Fussell describes the solution as a hybrid method. This method incorporates the rapid information flow and speed of a network and the efficiency and predictability from a bureaucratic system. The concept of an aligning narrative is at the heart of the hybrid model. This aligning narrative is a story that forces teammates to integrate their small-tribe norms into the mission enterprise.

Improving the IPT's Horizontal Alignment

The idea is simple—create a simple narrative that coalesces the team around a few basic attributes. Sounds easy, right? Well, it can be with the right narrative and a willingness to work together. As one might suspect, there are "tribal tendencies" within acquisition. Testers, program managers, and the requirements community all have their own unique parochial objectives. Often, this organizational strategic alignment comes from a mission statement. But these alignments tend to reinforce bad habits within IPTs. Each organization within an IPT works on behalf of its respective organizational leader. The teammate carries the organization's message and aligns vertically with the organization's mission. The problem is that this type of team tends to reinforce the inherent bureaucratic inefficiencies in which we work. Being reluctant to share information, working toward individual (versus team) accomplishments, and having mistrust within the team result from strong vertical alignment within each teammate's parent organization.

It is not that each organization's missions are unimportant or are necessarily in conflict with the others. But how can teammates within an IPT align horizontally instead of vertically with their organizations' strategic narratives? And who is responsible for horizontally aligning the IPT?

Consider the vertical versus horizontal alignment within an IPT. As discussed previously, a basketball team must work together with a shared purpose to achieve the team's goals (assuming again that the goal is to win and excel as a team). In a network model, the basketball team would have its own narrative that might not align with that of the coaches. If the basketball team operated like a bureaucratic organization, each member might report to a different coach having a different goal in mind, which would be an example of vertical alignment. Neither way leads to success, but a horizontal aligning narrative among the teammates from the head coach would give the best chance of success, of achieving the team's goals.



Members of an IPT tend to work within "silos," meaning that each person within the group is responsible for a certain aspect of the process. Whether it is the test lead from the program management office or the representative from the Department of Defense oversight agency, each member of the team has an area of expertise (i.e., each member is a subject-matter expert) and represents the member's organization's interests within the IPT. Each of these members is aligned to a parent organization's mission. The focus on vertical alignment within a team can make it difficult for these individuals to horizontally align to a specific narrative that is unique to the team.

Why is that? Articles such as "Why Strategy Execution Unravels—and What to Do About It" in the March 2015 *Harvard Business Review* explain how this strong strategic vertical alignment within teams actually makes it more difficult to work together. It may seem obvious, but if one builds a team of individuals who focus on individual goals rather than team accomplishments, it can be much harder to horizontally align to a common narrative within the team. This is not to say that having organizational mission statements and "role players" (such as a 3-point-shooter specialty on a basketball team) within a team is not important but that the inability of team members to align to a strategic team narrative creates the problems.

How Can Senior Leaders Help Develop High-Performing IPTs?

Who develops the narrative that horizontally aligns the IPT? The narrative must come from a leader, typically at a higher organizational level than those within the team, to create the context in which the team will operate. The horizontal aligning narrative should tell a story that aligns each of the teammates to a common mission and casts new light on each teammate's role within the team. The horizontal narrative should also emphasize the traits and characteristics that will be required from each teammate for the team to be successful. The narrative should encourage collaboration within the teams, build relationships, and begin to break down barriers that exist among "tribes." Fussell describes the aligning narrative of Gen. Stanley A. McChrystal, a retired four-star U.S. Army general and forebear of the concept "Team of Teams" as "Credibility = Proven Competence + Integrity + Relationships."

Developing a simple, profound horizontally-aligning narrative is much easier to say (or write about) than to do, and an aligning narrative is only one aspect of how a team can improve its performance. These changes require a cultural shift. And, the cultural shift isn't exclusive to the working level members of the IPT.

Senior leader (GO/SES) engagement at the IPT level is lacking. More frequent engagement with senior leaders would help the team horizontally align to a common IPT

narrative. There are pockets of success, such as those teams with IPT charters that lay out a foundational understanding of that aligning narrative, but it is more than requiring an IPT charter for every IPT. It is a fundamental change in how we operate within teams. The relationships built within the IPTs are fundamental to the IPT's success. But, the relationships the IPT builds with senior leaders, those who are generating the aligning narrative, are necessary for team success. This doesn't mean micromanaging the IPT but ensuring that the team is aligning to the horizontal narrative of the senior leaders. In fact, the IPT should be engaging with a senior leader forum to ensure that everyone is given the same information and an equal opportunity to engage in the process. For example, within a test and evaluation IPT, the senior leader forum would have representatives from the U.S. Army Test and Evaluation Command, U.S. Army Training and Doctrine Command, program executive office, and Army Staff. More oversight does not improve team performance—but frequent, open and honest discussions are critical to creating and maintaining the relationships between individual IPT members and senior.

Cultural change can be difficult and requires a willingness to change within every level of the Army. Fortunately, the Army has recently seen the need for change, including how we operate within teams. The Army has introduced the concept of cross-functional teams, or CFTs, along with establishing a four-star command, Army Futures Command (AFC) to alleviate some of the very problems outlined in this article. The GOs and SES leaders involved with the newly formed AFC and CFTs face the arduous task or pushing the Army into areas that may challenge some stakeholders' long-held and deeply entrenched beliefs. Individuals must reconcile their beliefs with the Army's mission and its unifying narrative. The narrative should not question a teammate's loyalty to the past, but it should push individuals to unite and continually improve the team's performance toward meeting the Army's goals.

Conclusion

The first step in problem solving is to recognize that there is a problem. The Army is poised to make great strides in cross-organizational teaming, and I am excited to see what the future holds. Complicated problems such as this are not solved overnight and there will be painful moments as the Army transitions to a more horizontally aligned team environment.

IPTs should not be considered a hurdle to achieving success. There is no substitute for a high-performing team. But my experience working with the acquisition community has shown me areas that can be improved. Each IPT member must know his or her purpose and have an active role in the IPT. Each IPT member must be free to interact and network with peers and leaders in every organization, and the artificial walls of bureaucracy must be eliminated. Creating a horizontally aligned narrative among the IPTs can help achieve a common purpose and "one-mission" attitude among IPT members. Senior leaders must be active participants in the IPT process, and engage in more cross-organizational forums that allow issues to surface and critical dialogue to take place. Overly formal briefings through each organizational chain of command can hamper the creation of a horizontally aligned narrative by reinforcing restrictive bureaucratic structures (for instance, those affecting information sharing and open dialogue).

I hope you have gained some insights into how to improve the IPT process and begin to put the "team" back in IPT. There is no silver bullet that will solve every IPT's woes. Even with an aligning narrative, senior leader forums and the creation of CFTs, nothing guarantees success. Every team member should accept ultimate responsibility for an IPT's success or failure.

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DoD'S FIRST
Human Capital Symposium

Ashley Calingo ■ Catherine Dunleavy

ACQUISITION WORKFORCE LEADERSHIP from across the Department of Defense, industry and academia joined forces at the inaugural Department of Defense (DoD) Human Capital Symposium May 1–2, 2018, in Southbridge, Massachusetts, to share workforce talent management innovations, initiatives and industry best practices.

"The purpose of this symposium is to communicate DoD workforce priorities and challenges; share workforce talent management innovations, initiatives and best practices in Industry; and provide a forum for industry-government engagement," said René Thomas-Rizzo, Director of Human Capital Initiatives, during her opening remarks at the symposium.

Calingo *and* **Dunleavy** *are members of the staff of the Department of Defense Human Capital Initiatives.*

The Office of Human Capital Initiatives implements workforce strategies, policies and procedures that position the DoD to attract and retain talented professionals, to guarantee that the defense workforce is highly skilled and trained to meet current and future needs, and that DoD acquisition professionals share a culture that is dedicated to excellence and to serving the needs of the warfighter.

Ellen Lord, Under Secretary of Defense for Acquisition and Sustainment, charged symposium attendees, who included workforce leadership spanning the military Services and 12 DoD agencies, to be innovative and agile while keeping the National Defense Strategy at the forefront of their minds.

"Everything we do is in the context of our National Defense Strategy, and one of the things that makes [Defense Secretary James N. Mattis] one of the best leaders in Washington is that he is very clear on his objectives," said Lord. "I want to make sure that we simplify the acquisition process [in order] to compliantly get capability downrange and into the hands of our warfighters."

←The Honorable Ellen M. Lord, Under Secretary of Defense for Acquisition and Sustainment, provides the keynote address to kick off DoD's inaugural Human Capital Symposium May 1, 2018. The event brought together members of DoD components, industry and academia in collaborating and sharing knowledge to help build the acquisition workforce of tomorrow.

→Shay Assad (standing), Director of Defense Pricing/Defense Procurement and Acquisition Policy, moderated the Senior Acquisition Executive panel. Panelists were (left to right) Program Executive Officer for Command, Control, Communications, Intelligence and Networks (C3I&N) Directorate Brig. Gen. Michael Schmidt; Naval Sea Systems Command Executive Director Jim Smerchansky; Principal Deputy to the Assistant Secretary of the Army—Acquisition, Logistics and Technology Jeffrey White; Defense Contract Management Agency Director Vice Adm David Lewis.

Department of Defense photos by Ashley Calingo

National Defense Strategy themes of lethality, reform and building an agile workforce permeated discussions throughout the 2-day event.

During the course of those 2 days, panelists from across the DoD shared their insights on a variety of acquisition workforce topics. Defense Procurement Acquisition Policy Director Shay Assad moderated a panel of senior acquisition executives from the Offices of the Assistant Secretary of the Army for Acquisition, Logistics and Technology, Air Force Acquisition, Naval Sea Systems Command and the Defense Contract Management Agency, as they discussed component workforce priorities and challenges.

Program executive officers from the U.S. Air Force's Command, Control, Communications, Intelligence and Networks program office, the U.S. Army's Force Projection office, the U.S. Army's Ground Combat Systems program office and the program manager for the Ground/Air Task Oriented Radar program provided their perspectives in a panel moderated by the Missile Defense Agency's Executive Director John James.

In one of the Symposium highlights, early career workforce participated in a panel discussing their values and motivations when selecting the DoD as their employer of choice.

Defense Acquisition University President James Woolsey moderated the academia panel featuring leadership from the Naval Postgraduate School, National Defense University, Army Logistics University, and the Air Force Institute of Technology as they discussed meeting the needs of a changing workforce in a rapidly-changing world.

Rounding out the industry panels were senior leaders from Boeing, Parsons, Northrop Grumman, Deloitte, Raytheon, Lockheed Martin, and Unisys Corp. Industry leaders spoke about leadership development and succession planning and provided guidance on workforce recruitment, development and retention best practices.

The symposium provided a rare opportunity for senior members of academia, industry and defense acquisition workforce leaders to come together and discuss issues, share ideas and disseminate information with the same goal in mind: creating a high-quality, high-performing, agile defense acquisition workforce that is empowered to deliver the best possible acquisition outcomes in support of the warfighter.

For further information, contact **Catherine.Dunleavy@hci.mil**.

←From left to right, HCI Director Rene Thomas Rizzo with the Early Career Workforce panel, including Alex Landon from the Air Force Materiel Command; Sacia Fowler from the Air Force Sustainment Center; and Ken Virtue from the Naval Surface Warfare Center Philadelphia. Panel moderator was retired Maj. Gen. Joe Balsku (far right).

↓John James (speaking), Executive Director of the Missile Defense Agency, moderated the Program Executive Officer/Program Manager panel. Panelists included Program Manager for Ground Air Task Oriented Radar John Karlovich; Deputy Project Manager Force Protection Steve Roberts; Deputy Program Executive Officer Ground Combat Systems Dr. Thomas Bagwell Jr.; and C3I&N Program Executive Officer Brig. Gen. Michael Schmidt.

DEFENSE**ACQUISITION**
WRITERS' GUIDELINES IN BRIEF

Purpose
Defense Acquisition is a bimonthly magazine published by DAU Press, Defense Acquisition University, for senior military personnel, civilians, defense contractors and defense industry professionals in program management and the acquisition, technology and logistics workforce.

Submission Procedures
Submit articles by e-mail to defacq@dau.mil. Submissions must include each author's name, mailing address, office phone number, e-mail address, and brief biographical statement. Each must also be accompanied by a copyright release. For each article submitted, please include three to four keywords that can be used to facilitate Web and data base searches.

Receipt of your submission will be acknowledged in 5 working days. You will be notified of our publication decision in 2 to 3 weeks. All decisions are final.

Deadlines
Note: If the magazine fills up before the author deadline, submissions are considered for the following issue.

Issue	Author Deadline
January–February	1 October
March–April	1 December
May–June	1 February
July–August	1 April
September–October	1 June
November–December	1 August

Audience
Defense Acquisition readers are mainly acquisition professionals serving in career positions covered by the Defense Acquisition Workforce Improvement Act (DAWIA) or industry equivalent.

Style
Defense Acquisition prints feature stories focusing on real people and events. The magazine seeks articles that reflect author experiences in and thoughts about acquisition rather than pages of researched information. Articles should discuss the individual's experience with problems and solutions in acquisition, contracting, logistics, or program management, or with emerging trends.

The magazine does not print academic papers; fact sheets; technical papers; white papers; or articles with footnotes, endnotes, or references. Manuscripts meeting any of those criteria are more suitable for DAU's journal, *Defense Acquisition Research Journal (ARJ)*.

Defense Acquisition does not reprint from other publications. Please do not submit manuscripts that have appeared elsewhere. *Defense Acquisition* does not publish endorsements of products for sale.

Length
Articles should be 1,500–2,500 words.

Format
Send submissions via e-mail as Microsoft Word attachments.

Graphics
Do not embed photographs or charts in the manuscript. Digital files of photos or graphics should be sent as e-mail attachments. **Each figure or chart must be saved as a separate file in the original software format in which it was created.**

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