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Stakeholder and Process Alignment
in Navy Installation Technology Transitions

Adventures in Defense Acquisition
by the Under Secretary of Defense for Acquisition, Technology, and Logistics

Bridging the "Valley of Death"

EVM System's High Cost
Fact or Fiction?

A Practical PM Guide to Requests for Equitable Adjustment
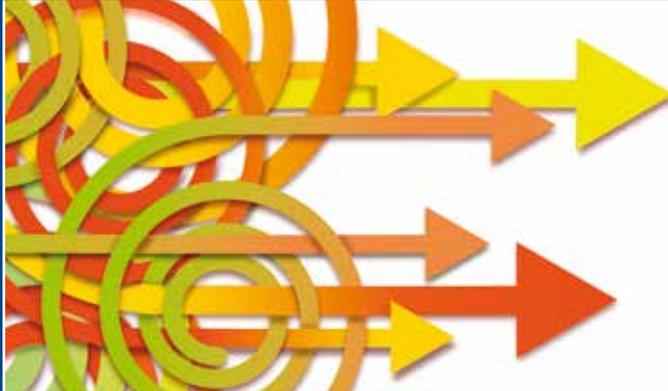
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Adventures in Defense Acquisition

Frank Kendall

For what is likely to be my last communication to the acquisition workforce as Under Secretary of Defense for Acquisition, Technology, and Logistics (USD[AT&L]), I thought I would share with you a few stories, all true, from my 45 or so years working in various aspects of defense acquisition, either in uniform, as a civil servant, in industry, or as an appointee. I've put them more or less in chronological order, starting with an experience I had while serving in Europe during the height of the Cold War. There has certainly been a lot of water under the bridge since then, and a lot has changed, but the things I've learned along the way are in many cases timeless.

During the 1970s, as an Army captain, I commanded a Hawk air defense battery in West Germany. We had a new battalion commander take over during that time. He immediately started a program he called "Victory Through Integrity" or VTI. This was the period of the readiness crisis and the "hollow force" following the end of the war in Vietnam.

Our new commander's ideas on logistics included that cross-leveling parts between units and cannibalizing down items of equipment, like our radars, was a violation of our integrity. We stopped doing these things and went nonoperational for several months while we stubbornly stuck to our "principles" about these maintenance policies. During that period, training as well as operational readiness suffered enormously. Eventually, the battalion commander was told to change his policies. He very reluctantly obeyed the order. I believe it is always important to act in a principled way, and in particular

to act with integrity, but in this case I felt that my commander had confused integrity with reasonable choices in management policy. Leaders will always have initiatives and labels to describe them (e.g., Better Buying Power), but when they represent management choices they should be viewed as just that—choices that can be reversed or changed based on new information (data) about how well they are working, or not.

In 1980, while still an Army captain, I attended my first congressional hearing. I believe it was the House Armed Services Committee. I was there in support of my boss at the time, the Army major general who was the Army's Ballistic Missile Defense program manager. He was one in a series of program managers providing testimony that day. This was about 3 years before President Reagan announced the Strategic Defense Initiative (SDI) program.

One of my most vivid memories of that hearing was the lead professional staff member for the committee holding up a schedule and chastising a witness for the degree of concurrency in his program. What I can't remember is whether he was for or against concurrency—but, whichever it was, he was passionate about it. We've been for and against concurrency several times since that hearing. Like many other decisions, the degree of concurrency (overlap between development and production) in a program is a judgment call motivated by many factors, first among them being confidence in the stability of the design. Early in my tenure as USD(AT&L), I referred to the extraordinary amount of concurrency, and the specific decision to start production on the F-35 fighter jet before any flight test data had been accumulated, as "acquisition malpractice." The press loves pithy expressions like this, so the comment got a lot of exposure. Concurrency decisions, like many others in acquisition, require critical thinking, sound professional judgment and taking a lot of program specific factors into account.

Careers can take strange turns. One of mine may have hinged on a 2 a.m. flight from Andrews Air Force Base in Maryland to Nantucket Island in Massachusetts. I was the Assistant Deputy Director of Defense Research and Engineering for Strategic Defense programs. My boss' boss' boss, the Under Secretary for Acquisition, was on vacation in Nantucket and was tasked on short notice to come back to Washington for a hearing on the SDI. I volunteered to fly to Nantucket on the MILAIR flight that would bring him back to DC and to prep him during the flight for the hearing, which would be held the same day. We picked him up at about 5 a.m. Nobody had told him I would be on the airplane, so he was a little surprised to see me. He was also pretty impressed that I had gone the extra mile to stay up all night so I could brief him. I accompanied him to the hearing, which went very well, in part because I had a chance to

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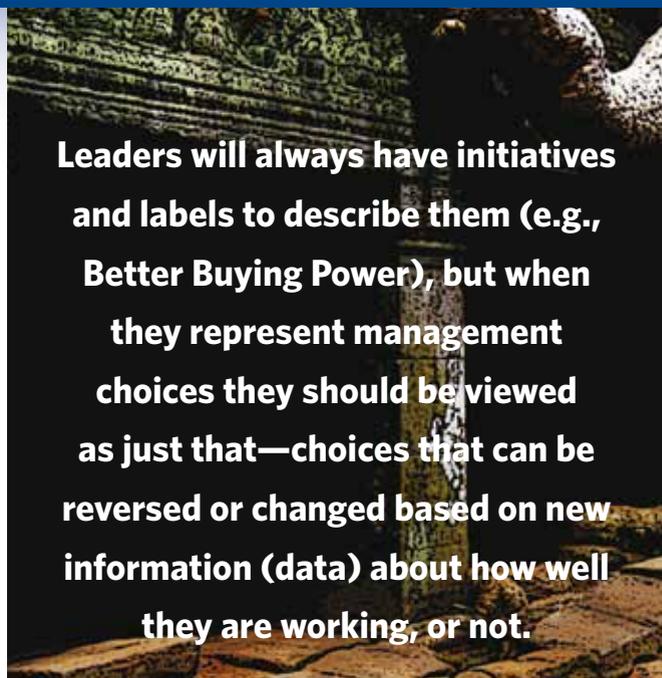
prep him thoroughly. Just after that, I applied to be the acting Director of Tactical Warfare Programs when the incumbent left government. This job, overseeing all of the Department of Defense (DoD) conventional weapons system programs and reporting directly to the Under Secretary, was my dream job at the time. I got the job.

While I was still the acting Director for Tactical Warfare Program, a period of 2.5 years when I didn't know if a political appointee would replace me, there were four changes in the officeholder of Under Secretary of Defense for Acquisition. One of these was a former executive from Ford who was totally new to Washington and DoD and who had just come onboard. At the time, we were struggling to get the Advanced Medium-Range Air-to-Air Missile program (AMRAAM) through testing and into production. Late on a Friday afternoon, I received a preliminary report from the Air Force that we had experienced a flight test failure. There was very little information on what had happened, so I decided to wait until I knew more before informing the Under Secretary. On Monday morning, I was at Patuxent River Naval Air Station in Maryland, getting a medical so I could do an F-18 flight out to a carrier. A perk of my position was that there were often good reasons for me to experience firsthand the performance of our conventional weapons programs.

Just as the flight physician was about to take my blood pressure, I received a call from the Under Secretary. The press had heard about the flight test failure and had asked the Secretary of Defense about it. He was clueless, so he asked the Under Secretary, who was also clueless because I hadn't informed him yet. When asked, the Air Force was understandably quick to point out that I had been informed right after the failure.
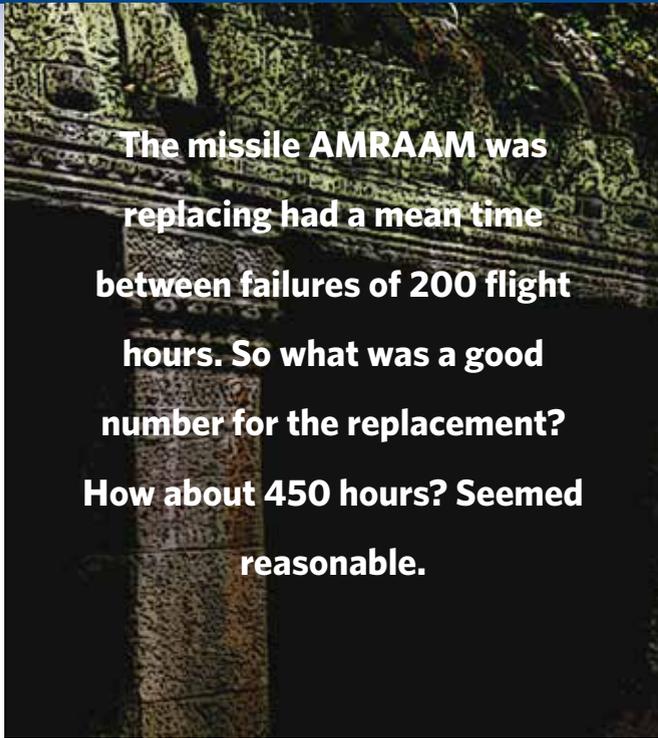
> **The missile AMRAAM was replacing had a mean time between failures of 200 flight hours. So what was a good number for the replacement? How about 450 hours? Seemed reasonable.**

The Under Secretary proceeded to rip me a new one, as they say. As soon as I got off the phone, the flight physician took my blood pressure. Eventually I did get to experience the F-18 flight, and eventually the "acting" status was removed from my title, but it took some time to recover from that initial impression. Nobody likes surprises, and the more senior one is the less one likes them. Bad news does not improve with age.

In addition to having problems completing flight test, the AMRAAM struggled for at least a year to demonstrate that it could meet one specific reliability requirement, the average number of hours it could be carried on an aircraft before a failure occurred. The requirement had been set arbitrarily at 450 hours. This was a totally unrealistic number that later analysis showed had no operational value or cost effectiveness. The requirement could have been dropped to 250 with minimal cost or operational impact. So why did we spend more than a year making holes in the sky to prove we could achieve 450 hours? Because we had failed operational testing and it had politically become a high-interest item. The program had a bad reputation and was at real risk of cancellation. The Services concluded that it was better to keep flying to try to achieve the requirement than to take the political risk associated with reducing it; so we kept flying. In those days, requirements were often set by relatively junior people with a high degree of arbitrariness. The missile AMRAAM was replacing had a mean time between failures of 200 flight hours. So what was a good number for the replacement? How about 450 hours? Seemed reasonable. Acquisition and operational people have to work in close cooperation. If you don't, this is the sort of thing that happens.

One of my programs in DoD was a special access Navy program to develop the A-12 stealthy fighter bomber. It had already started Engineering and Manufacturing Development when it fell under my portfolio. It was also touted as a new model for how to do acquisition effectively at the time—little oversight, firm fixed-price development, an acquisition approach that in the development phase teamed two competitors who would later compete for production, and a very aggressive schedule tied to fixed-price production options. It was a disaster waiting to happen. The A-12 is taught as a classic case study in how not to do acquisition, and for good reasons.

We have a lot of programs that struggle to get through development and into production, but most of them do get there. Programs like the A-12, where we spend billions of dollars and get nothing, are travesties. I won't try to tell this whole story here; it is available elsewhere in great detail. At that time, the Secretary of Defense was Dick Cheney, and we were doing something called "The Major Aircraft Review." In one of my briefings to Secretary Cheney, I had told him that based on earned value data (but not what the contractor or military Service were saying) the program was in big trouble, and would overrun by at least a year and $1 billion. I found that out from the DoD Earned Value Management guru at the time, Gary Christle.

After the A-12 blew up, figuratively speaking, and was canceled (properly so, as the Supreme Court finally concluded about 20 years later) there was an investigation, led by a general officer, into who knew what when. It turned out that John had briefed a member of my staff several weeks earlier, but no one had informed me. The data provided compelling evidence of where the program was headed. That member of my staff who had been briefed was a very capable Navy officer. However, instead of informing me of the data, he had immediately called the Navy staff to warn them about this threat to the Navy's program in the Office of the Secretary of Defense. I was rather upset when I found out he hadn't seen any reason to inform me, the person he was supposed to be working for. During the investigation, I brought this up, and in the report that followed I was criticized for not having adequately trained this officer in the fact that he had a duty to inform me, his supervisor, of any relevant information about the program he was overseeing for me. I'm not making this up. Service loyalties run deep.

The A-12 cancellation came about in part because the Secretary of Defense had testified that the program was progressing more or less on track. I don't know for a fact, but my guess is that he simply forgot about the concerns I had expressed to him during the major aircraft review. He had no reason to

dissemble, and he was put on the spot by a question he had not anticipated. A few months later, the contractors requested a bailout, embarrassing the Secretary, who subsequently ordered the program canceled. Two people on the Secretary's staff argued against cancellation—me and the Director of Acquisition Policy, Eleanor Spector. Our new boss, who replaced the previous Under Secretary for Acquisition at about that time, listened to us but kept his cards close. The decision meeting with Secretary Cheney took place early one morning, and neither Eleanor nor I attended. A few hours later, another member of the acquisition staff, who had been in the Secretary's briefing room for a subsequent meeting, dropped off a hard copy of a set of briefing charts he had found at the podium. They were the charts my boss, the new Under Secretary for Acquisition, had used to brief the Secretary. The final chart read: Recommendation—Termination. I don't know to this day if that was the right decision or not. Most of the time, as Eleanor and I maintained, one is better off working through problems to get the needed capability. This isn't always the case, however. I do know that 25 years later the Navy still doesn't have a stealthy tactical aircraft operating from a carrier, but we are getting close.

The Advanced Self-Protection Jammer or ASPJ is another program that didn't make it through the transition from development to production and fielding. ASPJ was another product of the fad of fixed-price development that was tried in the late 1980s. A good deal of my time in the early 1990s was spent cleaning up the many messes that this policy created. I have good experience-based reasons for wanting to avoid fixed-price development. ASPJ had another problem, however, and it had to do with algebra.

ASPJ was a jamming system for tactical aircraft. Its job was in part to jam enemy air defenses so that tactical aircraft wouldn't be shot down. In order to get through the Operational Testing phase to transition to full-rate production, ASPJ had to demonstrate that it could adequately perform this function. The metric for success was expressed as an algebraic equation that had to be statistically tested. The equation was built in part around the success of the jammer at defeating a threat after an air defense missile was launched against the aircraft with ASPJ on board. We made the mistake of not including the cases in which ASPJ was effective at preventing the launch, so these successes didn't count as part of the test. Again, we found ourselves in a situation where changing the rules would have been viewed with suspicion in the political environment around struggling acquisition programs. In this case, we did make the needed changes, but for other reasons the program was canceled in the defense drawdown that followed the Cold War. It was later resurrected with a different name and ultimately fielded.
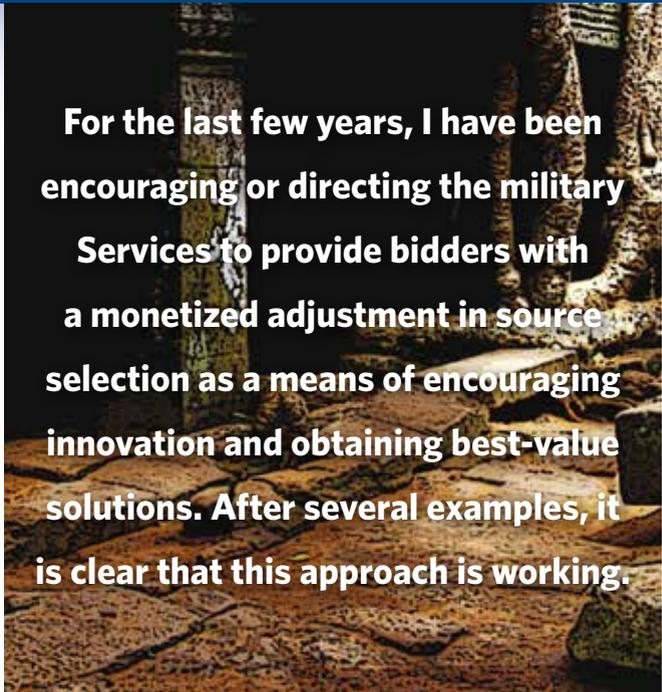
For the last few years, I have been encouraging or directing the military Services to provide bidders with a monetized adjustment in source selection as a means of encouraging innovation and obtaining best-value solutions. After several examples, it is clear that this approach is working.

A few years later, I had taken a position at Raytheon as Corporate Vice President of Engineering. We were in a tight competition with our most ferocious competitor, Hughes Aircraft, to build the next generation short-range air-to-air missile, the AIM-9X. We thought we had a much better design than our competitor and were sure we could offer the customer much better operational performance. We had a problem, however. From what we could tell from the draft request for proposals we had seen and from discussions with the Air Force, there was no way our higher performance could be considered in the source selection. We also anticipated a price disadvantage because our missile design, though innovative, was more complex—and we believed more costly as a result.

I spent a lot of time in the Pentagon trying to get the program management, the operational community, or the Under Secretary for Acquisition to provide some way for our better operational performance (a bigger engagement envelope and higher probability of kill) to be considered in source selection. I failed. In this case, we lost—but this occurred just as Raytheon was buying Hughes. Hughes had bid very low; we speculated that this was done so Hughes could book the business to enhance its attractiveness as an acquisition. In some respects, this was a lowest price technically acceptable source selection, something many in industry complain about today and something I have tried to limit to cases where it is really appropriate. Most of the time we do want higher performance, if it is at a price we would consider reasonable. For the last few years, I have been encouraging or directing the military Services to provide bidders with a monetized adjustment in source selection as a means of encouraging innovation and obtaining best-value solutions. After several examples, it is clear that this approach

is working. I wish it had been used in the 1990s when we were bidding on AIM-9X.

While I was in industry, I served for some time on the Army Science Advisory Board. One study we were involved in was a review of a weapon system that had featured prominently in the First Gulf War. It happened to be a weapon system that my company produced. I don't recall the reason, but as part of the study we needed some technical data on the system's performance. For reasons we didn't understand, we just couldn't get the program office to give us the data, despite several requests. Finally, one of the study group's members, retired Gen. Jack Vessey, the former Vice Chief of Staff of the Army, called the Chief of Staff to ask for some help. We got the data. I, however, got a call through my corporate headquarters to go to Washington to meet with a brigadier general on the Army staff responsible for the program to explain my reasoning, as I was associated with the request. The program office, fearing it might look bad somehow, had been slow-rolling us in providing the data and I was being called to task for having gone over everyone's head to the Chief of Staff through Gen. Vessey. My management wasn't pleased. Corporations know where their money comes from, and sometimes the people who control those funds have narrow ideas of what is right and what is wrong.

Another incident from my time in industry involved what I can only describe as abuse of power by a government acquisition official. At the time, my firm had two matters, totally unrelated and involving two programs, that we wanted resolved by the Service in question. One was a protest of a bid we had lost. It was not at all common for my firm to protest. We felt that it would upset our customers and that it was unlikely to succeed. In this case, we had lost a bid on something we considered a core business—a share of the market and a product that we had controlled for a very long time. We felt we had a legitimate reason to protest the source selection and it was important business—so we protested.

The other matter was a request we made of the same Service on another program that was coming up for source selection. We wanted some changes to the request-for-proposal language, changes we felt were fair and that just happened to be to our advantage. With these two matters on the table, we were visited by a senior flag officer from the Service involved. He asked us which of the two matters was most important to us and told us that the Service's decisions on them were "linked." I was shocked. In my view, then and now, the government should be resolving disputes or issues with industry on a case-by-case basis on the merits. I never found out if this conduct was illegal, but I'm certain that it was unethical. The government should not cut backroom deals in which it coerces a contractor to give up a legal right to a decision on the merits in return for a competitive advantage. The government has immense power over contractors, and has an obligation to not abuse that power. When it does abuse its power, trust is destroyed. By the way, my colleagues from industry and I did exactly the right thing: We ignored the question.

While I was in industry, I spent several years as an independent consultant. One of the projects I participated in was the Army's Future Combat Systems program or FCS. Like A-12, this program wasted billions of dollars and delivered basically nothing to the Army. It was hugely ambitious, driven by a "vision" that was divorced from reality and hobbled by totally unrealistic direction on schedule, imposed from the top of the Army.

The acquisition community within the Army took huge risks trying to execute the unrealistic 4.5-year schedule from start of development to a production decision—for the largest and most complex program in the history of the DoD. The acquisition strategy risks, including the contracting approach, a Lead System Integration, the immaturity of the requirements and the early loss of competitive incentive doomed the program before it started. The sanity check that the Under Secretary for Acquisition is supposed to provide failed under Service pressure to proceed. As soon as the responsible leadership departed the Army, the schedule was slipped 4 more years—but the damage had already been done. This is the most extreme example of something I have seen too many times; operational and Service leadership is always in a hurry and usually has no real understanding of what it takes to design, prototype, test or produce a specific product. This mistake cost the Army more than $10 billion of precious research and development funds and several years of modernization that can never be recovered.

The Services do have distinct cultures, and that includes how they relate to outside stakeholders and authorities. The classic allusion to "the dumb, the devious, and the defiant" isn't wholly accurate, but there are times when it seems apt. A better characterization might be that the Army knows how to salute to a fault, the Air Force likes to cite Office of the Secretary of Defense (OSD) direction as to why it is acting in a certain way, and the Navy would strongly prefer that there be no OSD direction. That is certainly an oversimplification, but it is a rough approximation of reality.

I could tell stories all day from my current tenure as USD(AT&L) about the Services, but here is one from my tenure as Principle Deputy Under Secretary: For some reason, we were having a meeting in my office with a brigadier general from the Army's acquisition community. We got into a discussion of several options for how to proceed on a specific program. It wasn't

a decision meeting, and staff members were just tossing out ideas for discussion. We did this for about 20 minutes and the meeting broke up. About an hour later, I received a note from the Army Acquisition Executive complaining about all the direction the brigadier had been given. He walked out the room convinced that he had just been directed to do every one of the things that had been discussed, when in fact he had been directed to do none of them. Apparently, he went back to his office with his hair on fire and started ranting about all the crazy guidance he was getting from every member of the DoD acquisition staff. I'm guessing that the Air Force would have picked any guidance they liked and implemented it but made clear it was at the direction of the OSD. The Navy would probably have regarded it as an amusing conversation and largely ignored it. Try as I might, I don't know that I ever convinced the Services, at least at the program manager level, to not take direction from random staff members with no directive authority over them. My policy was that the staff was there to advise me as the Defense Acquisition Executive, not to provide direction to the Services—but implementing that policy isn't as easy as it should be. A program manager trying to get his program approved just wants it approved, and is likely to err on the side of accepting direction if he or she thinks it will help achieve the goal. I finally directed my staff to identify all comments on Service plans as "Defense Acquisition Board Issue," discretionary, or administrative. This meant that I would have visibility into anything the staff thought was important to change. I think this has helped, but there is still room for progress.

We spend a lot of time trying to devise acquisition strategies that will effectively incentivize industry to deliver more of whatever the government wants. Industry has two priorities. In order of importance, they are to (1) win contracts, and (2) make money on them. The first is a prerequisite to the second. Government people should never lose sight of the fact that these imperatives always motivate industry. We can use them to get better results, but we need to be careful about unintended consequences.

A case in point was the Joint Advanced Guided Missile or JAGM, an Army-led joint program. The Army was conducting a competition and had asked industry to build competing prototypes as risk reduction efforts in support of the competition. The prototypes were to be flight tested as part of the source selection. I had challenged the Army's intention to use a fixed-price incentive contract for the next phase of work—Engineering and Manufacturing Development. My concern was the degree of risk for the upcoming phase. I asked the Army to bring in the engineers for the program to walk me through both competitors' designs, the one they would use in the early prototype testing as part of the source-selection

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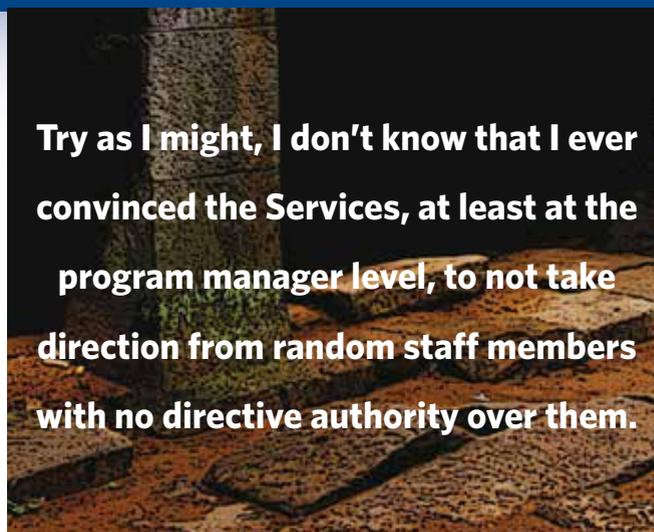
process and the production prototypes they were proposing to actually build in the next phase. What I discovered was that there was no traceability between the risk reduction prototypes and the production prototypes. Every subsystem of the missiles would have to be redesigned. The competitors were building "proof of principle" prototypes for the source selection. They were not reducing the risk in the designs they intended to build for production.

As a result of this, I directed the Army to change the contract type to one more suited for the remaining risk. Probably more importantly, the light bulb went on about what the competitors were trying to do. They were not motivated to reduce risk. That would have entailed taking some risk, and that was the opposite of what they were motivated to do. They were motivated to win, which meant that they wanted a low-risk and successful flight test so that they could win the contract. The government had asked for the things our policy supports and the Congress expects: competitive prototypes and flight tests. The government failed to insist on prototypes with designs traceable to the designs being bid for production and to the reduction of the specific risks associated with those designs. We can't blame industry for responding to the business incentives we provide. The government acquisition team must have the expertise it needs to understand what is required, and the professionalism to ensure that industry provides it. Industry will always act to maximize its return, and the government will get what it accepts.

It has been a great honor to have led the terrific men and women in the DoD's acquisition workforce. You are unsung heroes who, with equally dedicated and patriotic people in industry, provide our men and women in uniform with the products and services they need to defend our freedom. I hope that some of these anecdotes will prove useful as you continue your efforts to improve even more on the great work you do every day. Thank you. It has been wonderful to have been part of this team.
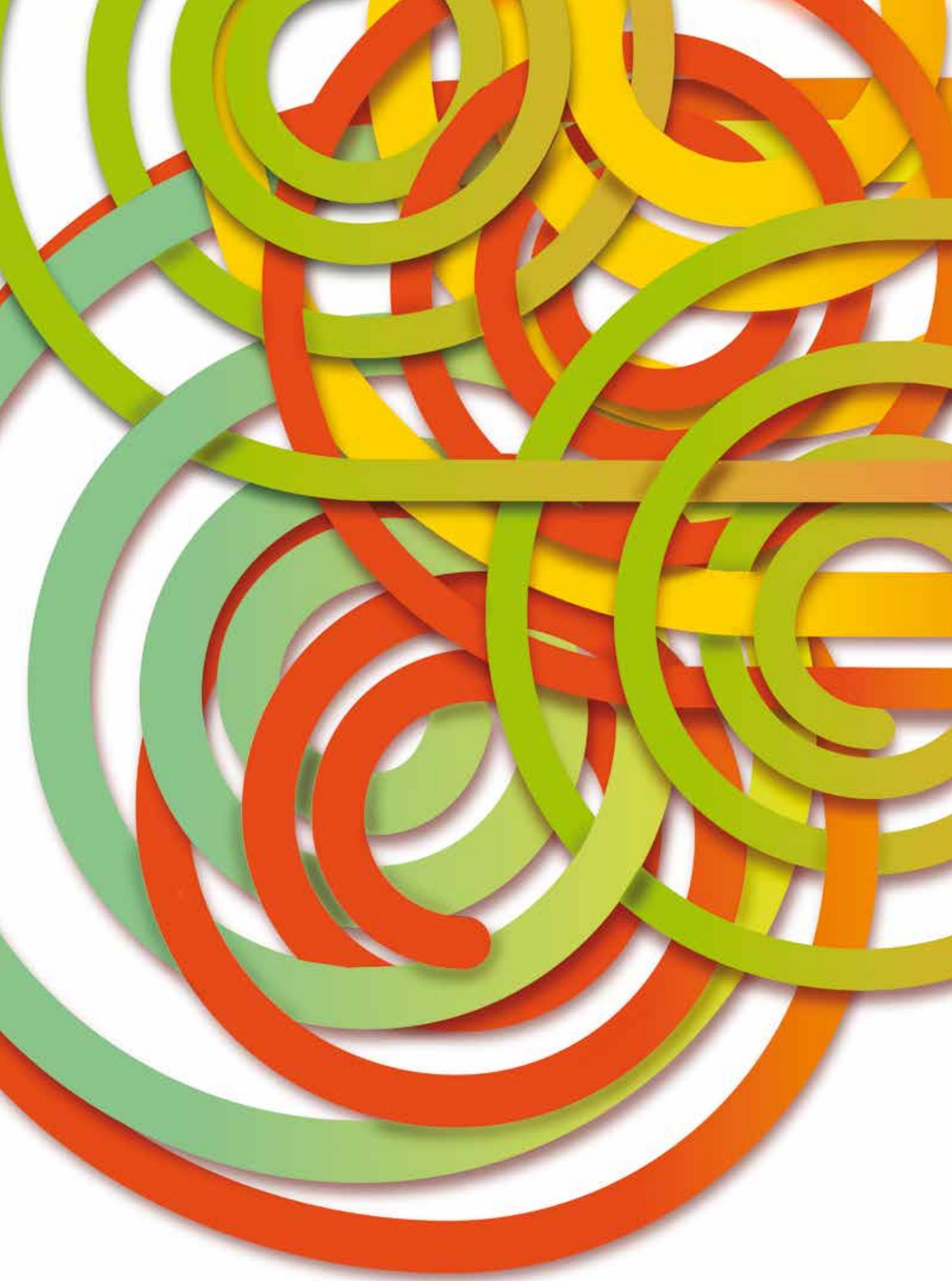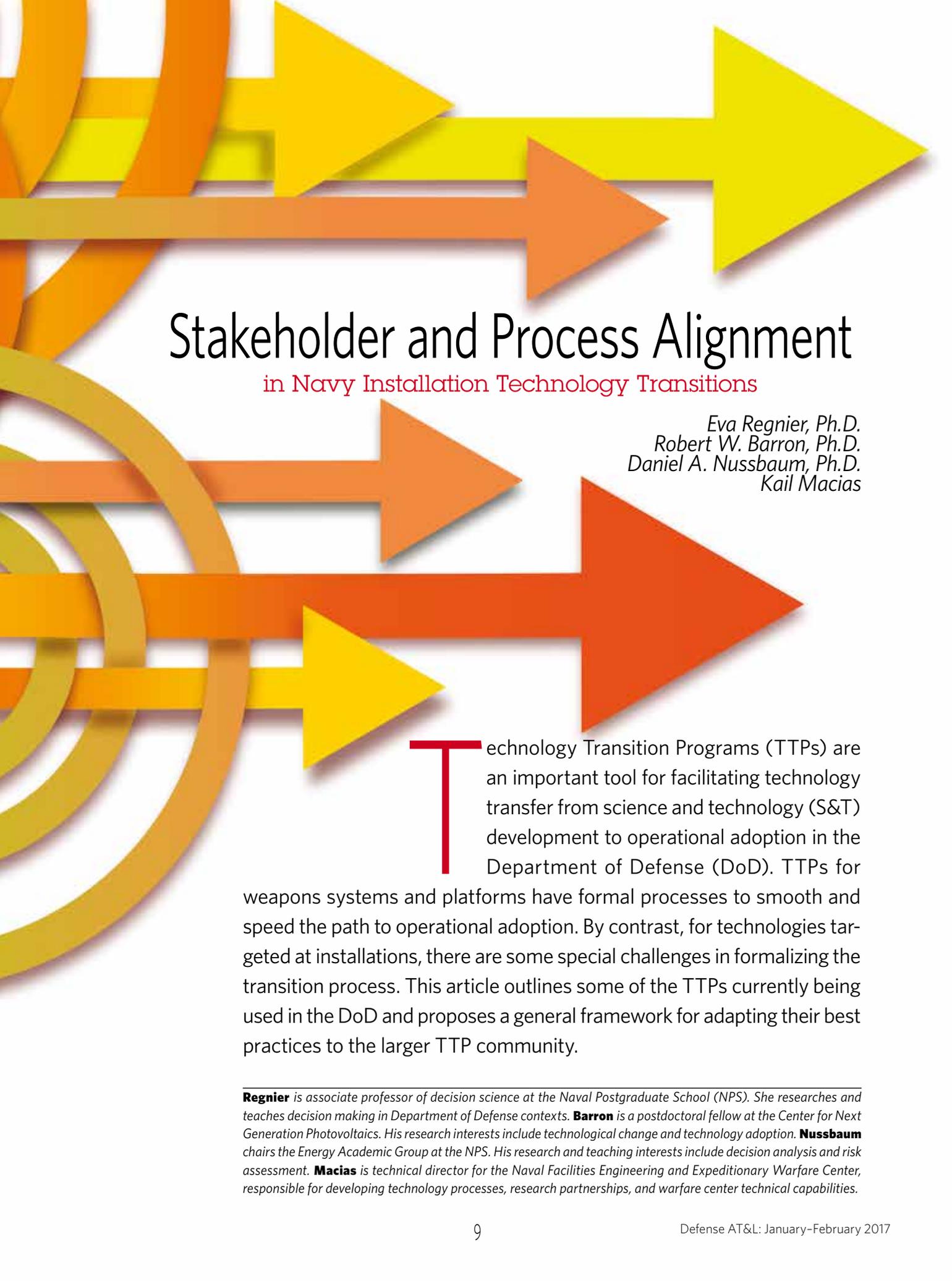
Stakeholder and Process Alignment

in Navy Installation Technology Transitions

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Technology Transition Programs (TTPs) are an important tool for facilitating technology transfer from science and technology (S&T) development to operational adoption in the Department of Defense (DoD). TTPs for weapons systems and platforms have formal processes to smooth and speed the path to operational adoption. By contrast, for technologies targeted at installations, there are some special challenges in formalizing the transition process. This article outlines some of the TTPs currently being used in the DoD and proposes a general framework for adapting their best practices to the larger TTP community.

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> **If a new technology is adopted, it does not necessarily replace every instance of an old technology, and the installation may need the capability to maintain both new and legacy equipment for an extended period.**

Stakeholder and Process Alignment Needed

The goal of TTPs is to speed the development of existing and emerging technologies for use in defense applications, and to increase the speed and likelihood of their successful and cost-effective operational adoption. A successful technology must not only perform properly, it must interface smoothly with other systems, meet requirements, be appealing to end-users and other stakeholders, and be compatible with the organization's processes, including planning, budgeting, contracting and technical approvals. For example, an energy-saving technology that has a net operational cost savings over 5 years may still be unable to compete with other projects that support operational requirements such as a hangar modernization or an upgraded pier.

Alternatively, a high-performance technology may not be adoptable simply because the Unified Facilities Criteria (UFC) doesn't allow it. If any of the key stakeholders, including maintenance, safety or cybersecurity personnel, has a technical or operational objection, the technology may not be adopted. These hurdles really do stop adoption. As stated in the 2013 Navy Environmental Sustainability Development to Integration (NESDI) program report:

> We have numerous technical success stories that are not fully integrated because of certain circumstances or conditions—some of which are totally outside the realm of a Principal Investigator. However, these circumstances or conditions must be identified so the appropriate person(s) can take action. Implementation of technology is difficult so you need to have a roadmap in place at the start and ask for directions along the way.

Stakeholder and Process Alignment in TTPs

The Government Accountability Office (GAO) identified the need for a gated review process to smooth the path for technologies transitioning from S&T into "product development" in 2006. By 2013, GAO reported that many DoD TTPs used technology transition agreements, which call for (nonbinding) commitment from stakeholders as a prerequisite for a technology moving through gates in the program. Well-known TTPs such as the Joint Capability Technology Demonstration program, and the Technology Insertion Program for Savings, target existing acquisition programs, generally a specific weapons system or platform.

In the installation environment, the need for TTPs to facilitate transition is similar, but the adoption ecosystem is different. One of the biggest differences between weapons systems and the installation environment is that the end-users are a more diffuse group. This complicates the problem in a number of ways. For example, every installation has a diverse group of facilities in terms of age, use and systems, where some may benefit from reduced power consumption and peak loads more than others, for example by realizing more cost savings.

Examples of TTPs for installation technologies in the Navy are the NESDI program, the Navy Shore Energy Technology Transition and Integration program, and the Energy Systems Technology Evaluation Program . Each of these programs has a multigate project review process to ensure early consideration of stakeholder needs and administrative processes.

General Framework for Stakeholder and Process Alignment

In the facilities context, end-users and operational engineers, such as installation energy managers, are rarely involved in S&T and therefore are not in a position to influence these projects. Within S&T, single-source procurement, installation of software, and hiring may all face much less stringent requirements than in the operational community. Consequently, S&T engineers may not be aware of real barriers to adoption facing operational engineers. Moreover, TTPs in the weapons system and platform acquisition context, usually designate a person to line up stakeholders and approval authorities, but in the installation context this responsibility often falls to the S&T engineers, who may not be properly trained to accomplish it.

Here we present the Adoption Readiness Level (ARL) scale (Table 1) as a tool for S&T engineers to facilitate stakeholder and process alignment. The ARLs synthesize and generalize principles for managing development of technologies for widespread adoption in an installation environment.

In keeping with the need to simultaneously integrate technologies with existing systems, secure stakeholder support and integrate with shore planning and funding, program and process requirements, the ARLs measure progress across three domains: technology integration, stakeholders and processes. Hurdles in any one of these domains will prevent adoption, regardless of the technology's suitability in the other two. Formal documentation and milestones related to all three areas increase the likelihood that important barriers will be recognized and addressed before they substantially delay or even prevent adoption. Conversely, insurmountable barriers that will ultimately prevent adoption will be recognized sooner, minimizing the costs associated with the failed project.

Table 1. Summary of Adoption Readiness Levels

ARL		Component Technology TRL	Systems-Level Technology Integration	Stakeholders	Processes
1	Application Identified	5	Potential to satisfy an existing or anticipated need more effectively than alternatives.	N/A	N/A
2	Demonstration Planning	5	Research plan developed, necessary facilities identified.	Stakeholders identified. Need verified.	Funding budgeted for demonstration phase. Approvals required for demonstration identified.
3	Representative Prototype	6	Demonstrated at representative research site. Performance documented.	Pilot performance validated by stakeholders.	Technical approvals required for operational use identified and documented. Testing or modification requirements documented.
4	Representative Demonstration	7	O&S requirements and any training requirements for O&S documented.	O&S funding levels and personnel requirements for sustainable support in operation estimated.	Process for getting technical approvals for operational use has been documented.
5	Fully Adoptable	8	Operating at representative research site or operational site for relevant time period. Performance requirements satisfied and documented.	Validated and accepted by stakeholders, including budget for procurement and ongoing O&S.	All required technical approvals have been received. Any required updates to Unified Facilities Criteria or Guide Specifications have been made or in process of being updated.
6	Adopted	8	In operational use at multiple installations.	Training and communication programs in place.	Technology installed and in operational use.

Technology

Typically, TTPs support S&T demonstrations of relatively mature technologies—at Technology Readiness Levels (TRLs) of 5 and above, and advance to a TRL 7 or 8. Often a candidate technology will be demonstrated in a research environment—and sometimes in an operational environment on a Navy installation. While S&T personnel generally well understand the technology domain, they may focus primarily on the readiness of the component technology under study. The technology domain encompasses not just the readiness of the technology itself but also its integration with other technologies, including equipment and software. Technology that performs well at a component level may not be suitable for integration into the installation ecosystem.

Operation and support (O&S) is a commonly overlooked element of technology integration. Installation maintenance personnel typically are responsible for many different types of equipment, often from different manufacturers and different vintages—e.g., one building with a brand-new heating ventilation and air conditioning (HVAC) system, and another with a 20-year-old HVAC system. If a new technology is adopted, it does not necessarily replace every instance of an old technology, and the installation may need the capability to maintain both new and legacy equipment for an extended period, requiring distinct expertise, spare parts, tools and other resources. Technology whose use or maintenance requires highly specialized training may not be adoptable for that reason alone. Alternatively, the technology may be adoptable only with additional budgeting—both funding and time—for the training, or contracting for specialized maintenance. The ARLs describe the need for identifying and documenting any training needed during the demonstration project.

Stakeholders

Stakeholders are individuals or entities that have an interest in the adoption of a technology or the ability to influence its success. A common pitfall in demonstration projects is to wait too long to engage all relevant stakeholders, such as facilities engineers, technical approval authorities and maintenance technicians. The ARLs provide a framework for identifying and engaging stakeholders, as well as documenting and meeting their needs.

One of the key functions of TTPs is demonstration: when potential end-users can see a technology in operation, they are much more likely to champion its adoption into their organization. As highlighted in ARL 6, TTPs encourage the S&T teams and motivate users to communicate the results in forums such as the Federal Energy Exchange.

Everywhere in DoD, projects must compete for resources. On the installation side, the trade-offs often are made at the installation level, and in many years projects compete for resources

with high-profile priorities. Technologies do need to compete on financials, but they also need to compete for end-user priority. For example, energy efficient lighting must compete for restoration and modernization funds head-to-head with projects like hangar upgrades, pier maintenance, housing and child development centers. In an installation context, TTPs often are focused on a particular strategic initiative, such as meeting federal installation energy mandates. For these TTPs, there may be short- or long-term funding sources that can be targeted to support the technology. For large projects, the technology may be adoptable using an Energy Savings Performance Contract. S&T engineers should identify a credible path to funding.

A further challenge for installation technologies is that the financial analysis may differ substantially across installations. For example, utility costs differ across installations; not only do rates per kilowatt-hour vary widely, but some utility contracts include charges for high peak demands, or power factor charges, while others do not. Therefore, it is not uncommon to see an incorrect preliminary financial analysis by a consultant or an analyst unfamiliar with the details of the specific utility contracts. This can require managers to modify the project before it is able to compete successfully, delaying or even preventing adoption.

Moreover, utility savings often are realized by a different organization than the one funding the investment, and the financial case may need to include allocating future savings from one budget to another. For some technologies, such as renewable energy, there is an ongoing O&S requirement. Often the decision authority for sustainment funding is different from the sponsor for the initial investment. Even for a demonstration project, if it is to operate long term, both types of funding must be available. For a successful operational adoption, the resource manager for sustainment is a critical stakeholder. This highlights the importance of early inclusion of all relevant stakeholders so that the buy-in from those responsible for each budget is supportive. It also highlights the importance of demonstrating a technology in a DoD installation, so that energy managers or other champions can point to a success elsewhere and find a counterpart of each needed stakeholder at the demonstration site.

Processes

The processes domain includes all planning and budgeting processes required to procure a technology, as well as any technical approvals required before a technology may be used at an installation. There is some overlap between the stakeholder and processes domains, as some of the hurdles in the processes domain create stakeholders, such as technical authorities. The stakeholder domain focuses on stakeholders who have an ongoing and operational interest in the technology and who provide funding, while the alignment of stakeholders who are part of approval and authorization processes and whose involvement is not necessarily ongoing after the technology is adopted are addressed in the processes domain.

Even if funding is budgeted, contracting for procurement can still present a hurdle for operational adoption. Federal acquisition regulations may cause delays and prevent adoption. For example, if specifications for a demonstrated technology are too narrow and there are only one or two vendors, it may be difficult to contract. S&T engineers may be unaware of this pitfall, as they may be able to acquire technology for research purposes without the same level of competition and scrutiny.

Safety, environmental, siting, UFC and cybersecurity requirements are all deal-breakers if they are not addressed. For example, the UFC currently prohibit the use of stationary lithium-ion battery systems inside occupied structures. A technology using lithium-ion batteries must get approval or a waiver for testing, evaluation and validation. If the technology is proven successful, then a request to have the UFC modified would need to be submitted for installation and use at other facilities. It is very important for S&T engineers to identify the technical authority and work with them early to identify the requirements and make any adjustments necessary to the demonstration project, and anticipate how a facility manager would handle the same requirements.

Cyber and information assurance authorities should be involved as soon as possible—it is generally much more difficult to fix issues later than early in the development process. If a demonstration project requires a special waiver that would not be readily available in a larger or more permanent adoption, the S&T team should work to identify a path to meeting the requirements in a wider adoption. Some technologies may require changes to the UFC, and this requires working with the criteria managers early on. S&T engineers should also consider whether scale would change the ability of the technology to get approvals—would a larger project trigger a different standard or level of scrutiny? As described for ARLs 4 and 5, S&T teams should document processes, as well as approvals, for reference by future managers who may wish to adopt the technology.

TTPs can greatly facilitate the adoption of valuable technologies. Identification of process hurdles and involvement of stakeholders while a technology is under development as part of a TTP is very important for transition. When stakeholder and process alignment are considered early in each project, technology transfer in TTPs becomes faster, cheaper and less risky. Failing to anticipate stakeholder and process hurdles often leads to situations in which technology cannot be adopted because critical elements were not addressed during the demonstration/validation phase, such as technical approval or identification of a transition resource sponsor and vehicle. The ARLs provide a general framework for anticipating hurdles and developing milestones for demonstration projects in TTPs. 🖋

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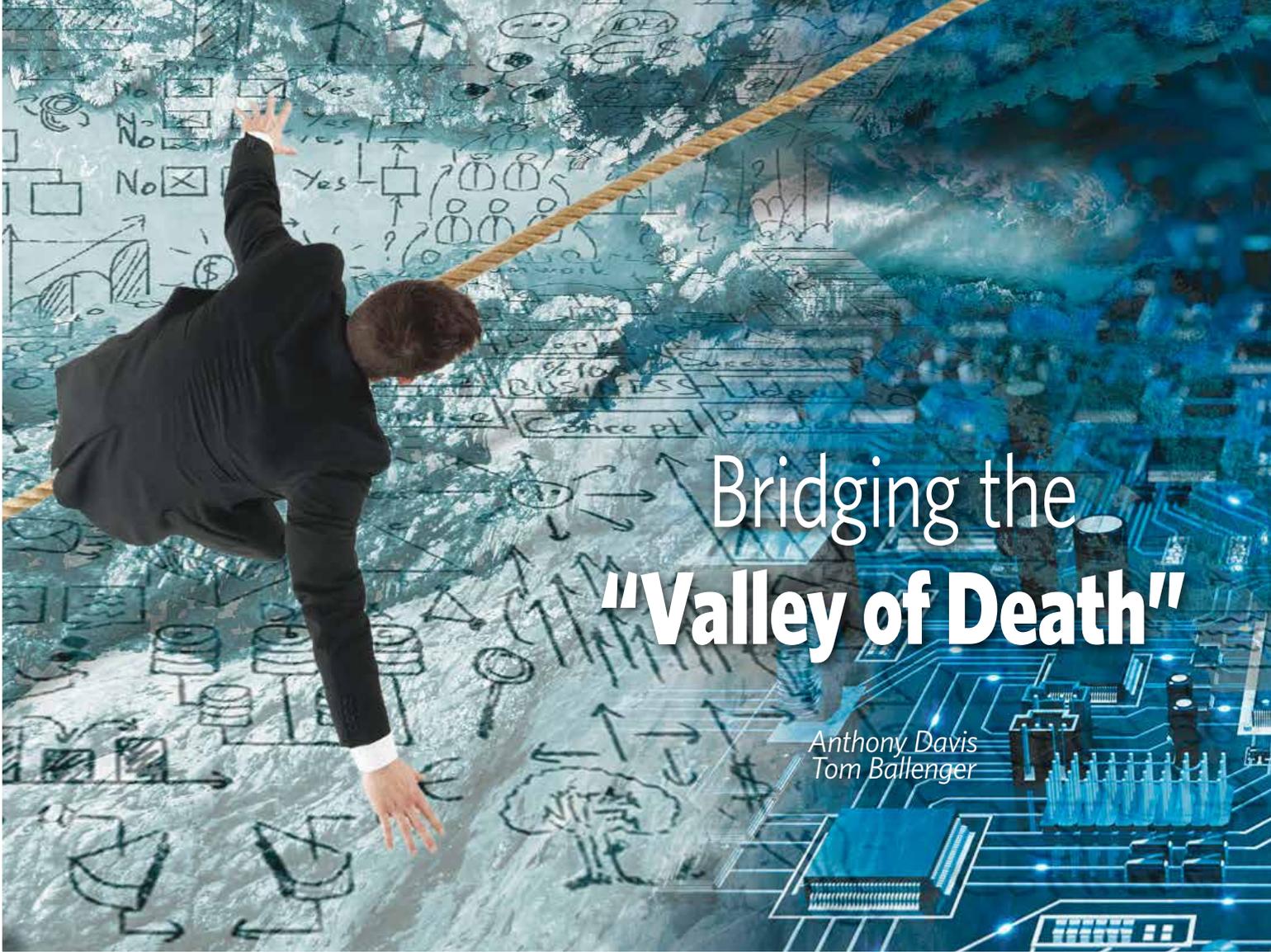
Bridging the "Valley of Death"

Anthony Davis
Tom Ballenger

The "valley of death" between technology development efforts and production programs has long been a problem in the government and private industry. Despite the U.S. Special Operations Command's (SOCOM) reputation for agile development and rapid acquisition, the same has been true for SOCOM. This article focuses on the development of a new methodology to capture discrete actions in preparation for a technology transition and measure organizational confidence in the success of that transition. Initial indications are that this process significantly increases the likelihood of successful technology transition and that the associated metrics and methodology could be quickly and easily adopted by other acquisition organizations to help them bridge their own "valleys of death" and avoid failed or suboptimal transitions.

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In 2014, the command's Special Operations Forces Acquisition, Technology, and Logistics organization (SOF AT&L) began trying to address its transition shortcomings by moving an experienced, proven SOF program executive officer (PEO) to direct the Science and Technology (S&T) organization. The PEO previously was quite vocal regarding the command's lack of success in regularly transitioning technologies to a program of record. After roughly a year in the S&T position, numerous changes had been made to increase the likelihood of successful transitions. Despite those efforts, the S&T director still had no real way to measure or predict the probability of transition success either for individual projects or across the portfolio. A team was chartered to look at appropriate leading and following metrics and began work on the problem.

During the research process, the team identified a separate but related issue. While the S&T project managers had a clear understanding that transition of their technology was a desired outcome, there was little common ground between that and the mandate of the PEOs' program managers who were driven by cost, schedule and the performance of their existing programmatic acquisition strategy.

So, the final challenge to the team was to (1) develop a series of metrics to measure the transition success of each S&T project, (2) ensure those metrics could be aggregated to the portfolio level, and (3) incorporate a mechanism that ensured S&T project managers and PEO program managers would have a common understanding of the mechanisms and motivations for transition.

The search for appropriate tools began with some known constraints. Ideally, a transition support metric would be easy to implement and actually decrease workload for portfolio man-

agement. It must fit within funding realities and existing data infrastructure. It must reflect the important balance between innovation opportunities and operational outcomes. To minimize cultural resistance to adoption, it must avoid external benchmarking as measures of success. Most importantly, it must support the SOCOM SOF AT&L customer.

Open-source research revealed a common theme across government and commercial development. While the ingredients and pathways of technological progress are well understood, there are few best-practice or standard mechanisms to measure and manage technology transition efforts. In some cases, projects were initiated or even completed before transition potential was determined. In other cases, project initiation required approval from an external oversight council to ensure alignment with the program enterprise. Neither of these extreme approaches are appropriate for SOCOM S&T implementation. The search continued for a solution between these extremes.

The Government Accountability Office (GAO) has studied this issue for more than 40 years. In multiple reports dating back to 1974, GAO has called for better transition metrics and more active management of transition efforts. In recent years, they highlighted the success of transition commitment metrics used by the Joint Capability Technology Demonstration and Future Naval Capabilities programs. These scales scored each project by whether a transition agreement was complete, in progress or absent. Implementation of standardized transition assessment was a step in the right direction.

The innovation environment at SOCOM AT&L encourages risk taking in S&T. Signed transition agreements represent a very high standard for projects. Special Operations PEOs seek to

retain their programs' agility and will not readily commit to unproven solutions. A transition commitment metric tailored for use in SOCOM S&T needs to recognize more incremental precursor steps. The Technology Readiness Level (TRL) scale fills a similar role in the realm of technology risk. GAO recommended DoD-wide adoption of TRL in 1999 following successful use by NASA and the U.S. Air Force. It is well-understood, universally accepted, and applicable across a wide variety of technologies. It is as useful as it is simple. We set out to establish a similar tool for transition management.

The simplicity and applicability of TRL became the tailoring benchmark for a new transition commitment metric. The team first replaced the term commitment with confidence to better reflect a dynamic continuum rather than a binary condition. The new Transition Confidence Level (TCL) scale has the same numerical range and objective accomplishment-based approach as the TRL scale. The 1-9 scaling was initiated as a matter of convenience but later proved to support some compelling data visualization relative to TRL. The steps follow a logical arc from uncertainty to a completed transition, as shown in Table 1.

Like the TRL chart, the steps enable status scoring for a project, and they form a roadmap for progress and coordination typically needed for transition success. In that sense, the TCL chart is both a scorecard and a checklist. The defining characteristics of each level are tailorable to organizational behaviors or changing dynamics between technology developers and PEO leaders. The chart retains its usefulness as long as it represents the organization's desired steps between project initiation inputs and completed transitions. The current iteration allows a project to proceed to TCL 4 dependent only on internal S&T Directorate activities. These precursor steps provide a progress report on the S&T team's transition planning during initial project incubation. Advancement to TCL 5 and beyond requires explicit cooperation and increasing coordination with a program office. A project at TCL 7 and 8 merits senior leader attention to ensure high-level coordination for funding, contract actions and organizational handover. We expect the contents of the chart to evolve to meet emerging process changes and support maturing relationships with transition stakeholders.

Implementation of the TCL metric included workforce training, project assessments, TCL chart configuration management, and incorporation of TCL data entry into the Directorate's knowledge management portal. Workforce training was not difficult. Each technologist and project manager was already familiar with transition planning, command expectations, and the use of similar tools like the TRL scale. Introduction of TCL simply assigned a number and standardized a reporting framework for a process the workforce members already were executing. Project assessments were straightforward. The technology transition lead for the Directorate became the configuration manager for the TCL chart and would control its contents and evolution. The knowledge management portal

Table 1. Transition Confidence Level Scale

Level	Characteristics
9	• Transition to PEO funding and management completed • Transition After Action Report and storyboard documented on S&T portal • Transition success report to AT&L
8	• Signed transition agreement between PM and S&T • Transition funding committed
7	• Integration strategy defined • Transition cost estimate complete • Potential funding sources identified
6	• Transition technical goals approved by PM, S&T • Transition schedule estimate developed • Project included in PM plans as a potential source
5	• Expressed interest from PM office • Active communication with named PM contact
4	• Target PMs briefed and provided progress updates • Key transition stakeholders named • Relevant programs named
3	• Specific project technical goals established • Target acquisition programs identified • Potential transition stakeholders identified
2	• Project initiated • TRL goals established (baseline)
1	• Working Group interest expressed • Active tech discovery • Acknowledged gap

Figures and tables by the authors.

modification was completed via established change request procedures. Of note, the data entry method for the portal did not include TCL definitions, only the number. This decoupled configuration management of the TCL scale from the portal modification process. Once each project had a TCL value and action officers could keep that value updated in the portal, management metrics can be extracted to inform portfolio decisions across diverse efforts and projects.

The implemented TCL metric enables consistent, uniform discussions of transition likelihood across different types of technologies. The steps capture the organization's pathway for S&T and program coordination, encouraging both sides of the "valley of death" to lean toward each other to close the gap. Especially for those steps requiring accord between S&T leaders and program managers, it provides a dispassionate, objective framework for discussions and organizational progress. It makes project relevance and transition outcomes a part of every project discussion while contributing to portfolio transparency. The ability to adapt the characteristics of each level ensures relevance as organizational relationships and needs change. Finally, TCL can quickly cue leaders in both the S&T and program spheres to imbalances in the portfolio. The ability to quickly identify outliers allows leaders to allocate their time and attention where they are needed most.

At the individual project level, TCL quantifies a project's transition status. At the portfolio level, it provides an organizational health indicator that can cue leader decisions. While individual project officers strive for the highest TCL possible for their projects, a very high average TCL for the entire portfolio may indicate inappropriate risk avoidance. If every project will transition, the valiant failures of a dynamic research organization are missing. Conversely, a very low average TCL may indicate a lack of relevance to supported programs. In the case of SOCOM S&T, the target TCL is intended to hover between 4 and 7. It will probably reflect some seasonality under fiscal rules as cohorts of new projects will drive down portfolio TCL upon initiation. As projects mature, the TCL will increase until driven down by a new class of projects with the following year's appropriation. Likewise, once projects complete their transition and leave the portfolio, their high TCL scores are removed from the equation to be replaced by lower TCL new projects. While not directly coupled, average TRL of the portfolio will follow similar ebbs and flows. An example visualization of average TRL and TCL is shown in Figure 1.

The ability to measure transition confidence in a scale calibrated to technology readiness enables some helpful visualization. The hypothetical S&T portfolio in Table 2 includes data for current TRL, current TCL, and budget. A quick graphic presents a powerful visual tool, shown in Figure 2. Money and time will tend to move projects to the right. Project relevance and program office coordination will tend to move projects toward the top. Relative budget size is an indicator of command priority and risk tolerance. Taken together, these metrics reveal that expensive projects in the bottom right of the chart might be consuming resources best spent on projects at the top left of the chart. No specific behavior rules are needed. The chart is a decision-support tool that graphically presents key data for numerous projects to enable leaders to make more informed decisions no matter the trade space.

Because TCL does not invoke any external standards, S&T organizations are only making internal comparisons. This alleviates concerns about different missions, stakeholders and

Figure 1. Portfolio Average TRL and TCL

Figure 2. Hypothetical TRL, TCL, and Budget Data Visualization
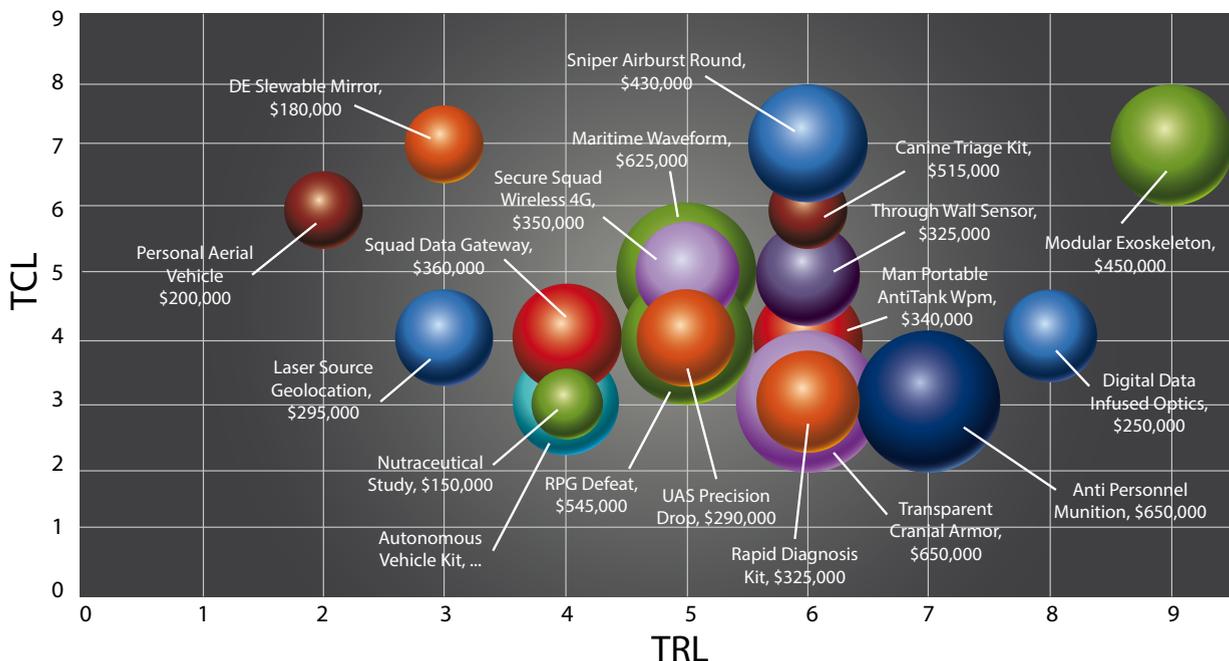
desired outcomes amongst the many diverse development organizations. Leaders can set their own internal goals and manage against them.

TCL can also contribute to project storyboards for both current status and archiving. When combined with TRL and financial execution data and goals over time, a powerful visualization is formed showing a single timeline of obligations, expenditures, TRL, and TCL; an example is shown in Figure 3. Using averages for TRL and TCL, the storyboard can cover multiple projects within a function or the entire portfolio to compare performance between divisions or year to year.

SOCOM S&T has implemented TCL, and requires its project managers to track and report the measure along with TRL for each of their projects on a recurring basis. The lack of subjectivity in the scale makes it easy to score projects, monitor progress over time, and quickly assess average TCL for the entire portfolio or other subordinate areas. TCL quickly identifies the outliers, allowing leadership to concentrate on candidates for more direct senior coordination, candidates for divestment, and candidates requiring additional funding versus projects "on glideslope" for transition. The data and visualizations can be used explicitly for a management by exception approach or as a tailorable decision support tool for portfolio management.

The adoption of TCL has provided a wealth of insight into the progress of the S&T portfolio toward transition with a minimum of additional data entry. Additionally, the presence of this data on SOF AT&L's real time dashboard provides complete transparency and understanding between the project manager, S&T director, program manager and PEO. The command believes the tool has immediate potential application to numerous S&T organizations and portfolios and is easily adaptable to fit each organization's particular needs.

SOCOM S&T plans to continue use of TCL and TRL as complementary measures of project performance, and will continue maturing visualization tools to support informed leadership decision making. The command welcomes any inputs or ideas for how to improve the metrics or visualizations, and is interested in discussing those ideas further. &

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Table 2. Hypothetical S&T Project Data

Project Name	Budgeted	TRL Now	Current TCL
Digital Data Infused Optics	$250,000	8	4
Man Portable AntiTank Wpn	$340,000	6	4
Maritime Waveform	$625,000	5	5
Transparent Cranial Armor	$280,000	6	3
Anti Personnel Munition	$650,000	7	3
Rapid Diagnosis Kit	$325,000	6	4
Laser Source Geolocation	$295,000	3	4
Personal Aerial Vehicle	$200,000	2	6
Modular Exoskeleton	$450,000	9	7
Through Wall Sensor	$325,000	6	5
Expendable ISR	$380,000	5	4
DE Slewable Mirror	$180,000	3	7
Diver Thermal Control	$225,000	6	7
Canine Triage Kit	$215,000	6	6
RPG Defeat	$545,000	5	4
Secure Squad Wireless 4G	$350,000	5	5
Autonomous Vehicle Kit	$345,000	4	3
UAS Precision Drop	$290,000	5	4
Sniper Airburst Round	$430,000	6	7
Squad Data Gateway	$360,000	4	4
Nutraceutical Study	$150,000	4	3

Figure 3. Hypothetical Project Storyboard
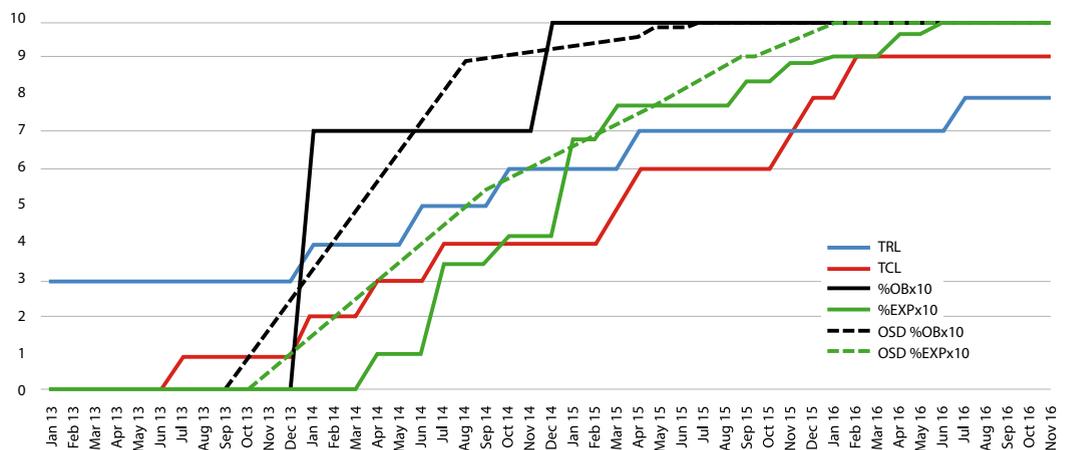
EVM System's High Cost

Fact or Fiction?

Ivan Bembers
Ed Knox
Michelle Jones
Jeff Traczyk
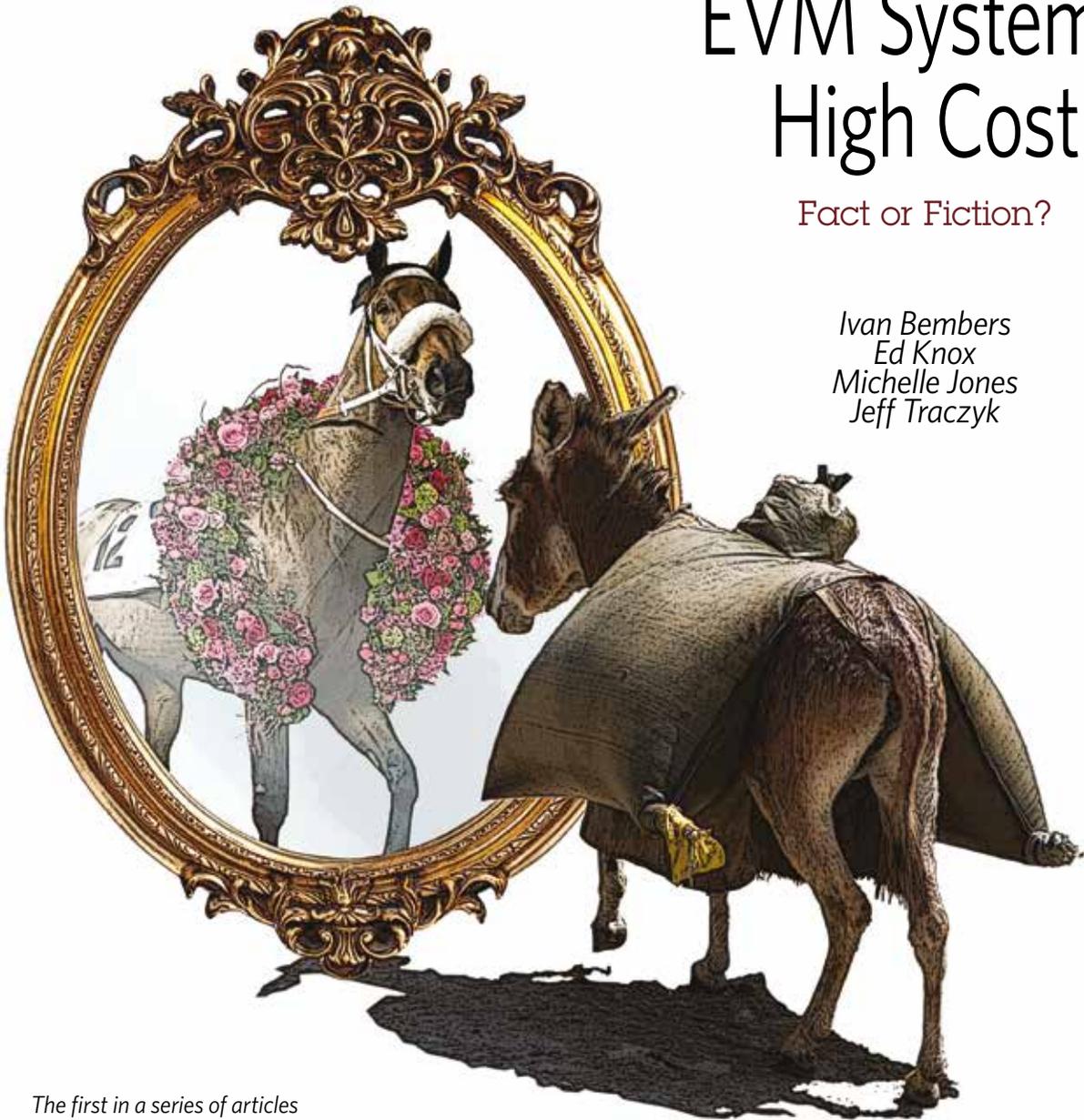
The first in a series of articles

t seems like every year the writing of budgets sparks proposals to eliminate the Earned Value Management System (EVMS) requirements on federal acquisitions as a way to save millions of dollars. People suggest the government can do away with EVMS in favor of more efficient and affordable management techniques. But is there a basis for these assertions? For more than 50 years, the Department of Defense (DoD) has recognized the power of both EVMS and the Cost/Schedule Control Systems Criteria (C/SCSC), the forerunner to EVMS, and has kept EVMS requirements in place to promote sound planning and effective program execution.

The Government Accountability Office (GAO) has consistently cited EVMS as providing a comprehensive early warning of potential cost and schedule overruns. Furthermore, most major aerospace and defense (A&D) industry partners have made the business decision to adopt EVMS as a standard way of doing business on all types of

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development work, including commercial, fixed-price, and government cost type contracts. Why then do we hear the yearly grumbling about the burden of EVMS on government programs?

In 1994, Coopers & Lybrand/ TASC (CLT) performed a study that included an assessment of the cost of C/ SCSC. The CLT study, often cited as the definitive source in this matter, concluded that there was a 0.9 percent DoD regulatory cost premium for C/SCSC on government contracts. (The study noted, however, that the majority of the cost premium resulted from excessive requirements that were not inherent in C/ SCSC.) Following that effort, Dr. David S. Christensen consolidated a number of other studies in *The Costs and Benefits of the Earned Value Management Process* and identified the cost of EVMS to be somewhere between 0.1 percent to 5 percent of the contract value. While these studies provide excellent information, all of their supporting data was gathered before 1996, when industry took more ownership of EVMS. In December of that year, Under Secretary of Defense (Acquisition and Technology) Dr. Paul Kaminski accepted industry's 32 guidelines for EVMS and rolled them into the 1997 DoD Instruction 5000.2R. By July 1998, the guidelines were formally issued as an American National Standards Institute/ Electronic Industries Alliance document, creating a national EVMS standard that was applicable beyond DoD programs. To this point, in 2014, the National Reconnaissance Office (NRO) Earned Value Management Center of Excellence (ECE) examined a large number of its major acquisitions

Figure 1. NRO Study of EVMS Requirements
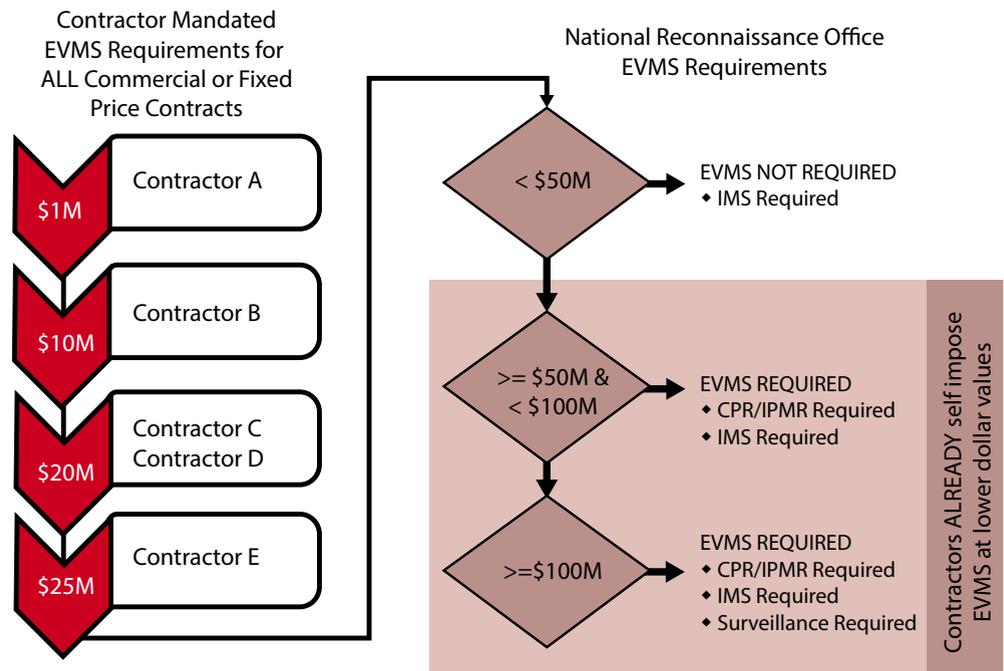
and discovered that every prime contractor reviewed had an internal EVMS threshold for in-house, commercial or fixed-price efforts that was much lower than the requirement for NRO acquisitions (Figure 1).

If major industry partners within A&D rely on and use EVMS for government cost type, fixed-price and commercial efforts, and they have a management control system in place, then

Figure 2. The Joint Space Cost Council Better EVMS Implementation Study
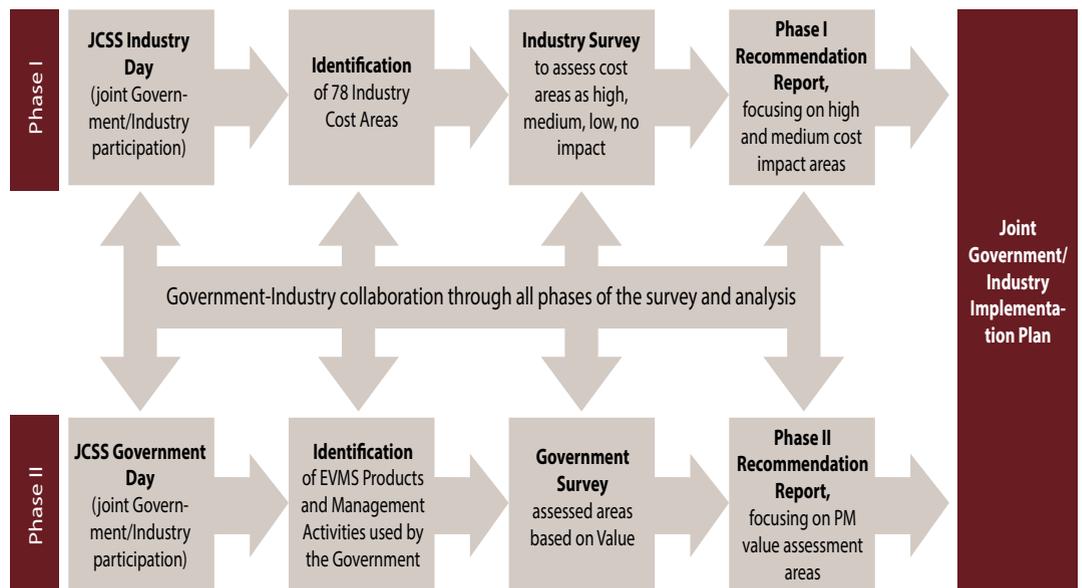
Figure 3. Phase I Survey Results

Breakout of EVMS Cost Impacts

27% High & Medium Impacts

- High 13%
- Medium 14%
- Low 28%
- No Impact 45%

Stakeholders for High and Medium Impacts

- NRO ECE 4%
- Not Identified 4%
- DCAA 0%
- Cost Estimators 2%
- DCMA 19%
- KTR Program Mgmt 10%
- Gov Program Mgmt 40%
- KTR EVM Process Owner 12%
- Contracting Officer 8%
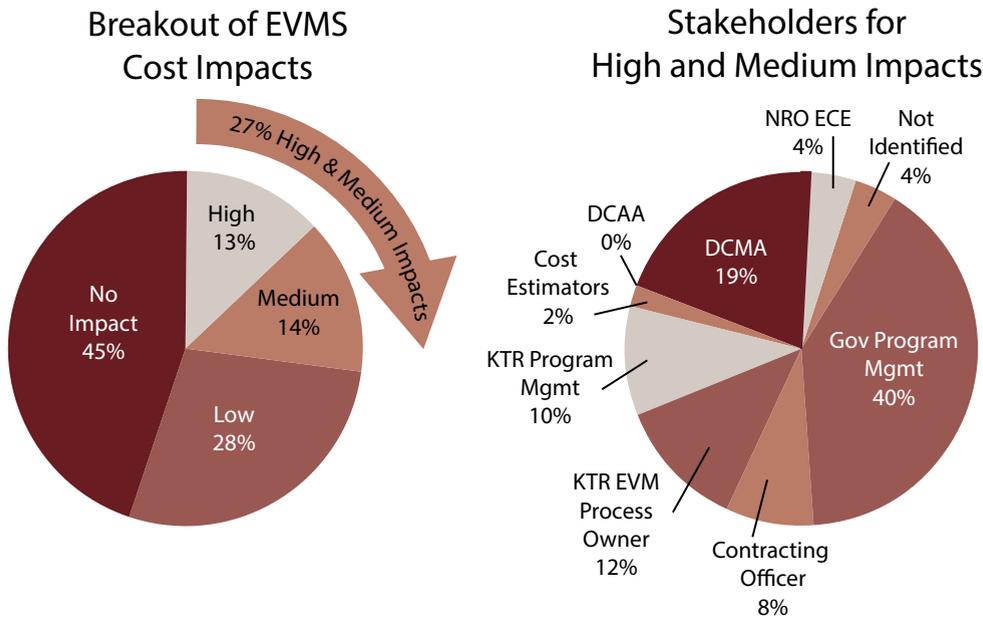
DCMA=Defense Contract Management Agency; KTR=contractor; PARCA=DoD Office of Performance Assessment and Root Cause Analyses

several questions need to be answered regarding any real or perceived additional costs of implementing EVMS on government programs:

- What are the differences in applying EVMS on a government cost type contract versus a commercial or fixed-price contract (including reporting requirements)?
- What are the underlying costs of these differences?
- What is the government value and derived benefit of these differences (i.e., additional deliverables or requirements that substantially help manage the program)?
- Are there opportunities to generate better efficiencies for these differences, especially in areas with claims of high cost and low value?

In 2013, the Joint Space Cost Council (JSCC) initiated the *Better EVMS Implementation Study* to address these questions. The JSCC was established by the Under Secretary of Defense for Acquisition, Technology, and Logistics and the Under Secretary of the Air Force as a joint government and industry forum with a commitment to affordable, accurate and credible cost estimating on space systems. The JSCC also actively addresses cost estimating and earned value management issues with the goal of improving cost-estimating accuracy and the betterment of earned value management practices, which in turn affect budget realism and improve schedule and program execution.

Due to the study's extensive scope, the JSCC divided it into two parts (Figure 2). Phase I (completed in 2015) targeted industry and was designed to understand the delta implementation cost impacts of EVMS required for a government cost

type contract versus EVMS performed on a commercial, internal, or fixed-price effort. Phase II (completed in 2016) targeted the federal government program managers (PMs) and focused on understanding how those PMs value and use EVMS products and management activities (P&MA).

During Phase I, the JSCC collected information from 46 separate space programs ranging in value from $20 million to more than $5 billion at Ball Aerospace, Boeing, Northrop Grumman, Lockheed Martin and Raytheon. This phase used survey responses to analyze 78 specific cost areas identified by industry as the key cost drivers (real or perceived) for applying EVMS on government cost type contracts. As shown in Figure 3, nearly 73 percent of survey responses identified the cost areas as No or Low Impact on the cost of EVMS, and the data identified government program management as the primary stakeholder driving High and Medium Impacts. Furthermore, cost impacts were scattered among all 78 cost areas, and no single cost area was identified as a High or Medium Impact across a majority of the programs that participated in the study.

Using Phase I data, the JSCC identified three overall themes regarding the cost of EVMS. First, Control Account (CA) level (size and number) significantly affects the cost of EVMS. Second, program volatility and lack of clarity about the program's scope as well as funding uncertainty may affect the cost of EVMS, just as any other program management discipline. Third, volume of reviews (including surveillance, compliance, and Integrated Baseline Reviews [IBRs]) as well as the inconsistent interpretation of the 32 Guidelines affects the cost of EVMS (this theme could have two separate parts, but was originally based on industry's interpretation of all government reviews). In April 2015, these themes were published in *Better EVMS Implementation Themes and Recommendations* along with specific recommendations to reduce cost.

Government and industry EVMS subject-matter experts (SMEs) also made several other observations regarding Phase I:

- Inconsistent government PM application of EVMS requirements appears to be the leading driver of High and Medium Impacts to the cost of EVMS.

- Inconsistent assessment of the materiality of Surveillance Review findings can affect the cost of EVMS (e.g., reviewer's experience level, approach, etc.).
- The JSCC survey data does not substantiate the numerous anecdotal perceptions of major earned value-related cost impacts (e.g., IBRs cost too much, etc.).

During Phase II, the JSCC interviewed 32 government PMs at Air Force Space and Missile Systems Center, the National Aeronautics and Space Administration, and the NRO to assess the government value of EVMS. The JSCC assessed 12 specific EVMS P&MA ranging from Earned Value Data by Work Breakdown Structure (WBS), commonly known as Contract Performance Report/Integrated Program Management Report (CPR/IPMR) Format 1 to Over Target Baseline/Schedule (OTB/OTS). As shown in Figure 4, the results indicated that Integrated Master Schedule (IMS), the IBR and EVM Metrics were the most highly valued P&MA by government PMs. Even the lowest scoring P&MA, such as Earned Value Data by OBS (CPR/IPMR Format 2) and Integrated Master Plan (IMP), were identified as having medium value.

In September 2016, the JSCC updated *Better EVMS Implementation Themes and Recommendations* to include a series of recommendations on ways to increase value for each EVMS P&MA assessed in Phase II. These recommendations are rooted in the use of best management practices as well as education on how to use these EVMS P&MA better. As with Phase I, government and industry participants also provided additional observations:

- Most government PMs have a strong appreciation of EVMS—in many cases, they assess P&MA at the highest possible level and identify a heavy reliance of EVMS metrics during program execution.
- Most government PMs recognize the value of the IBR to generate a valid and executable Performance Measurement Baseline (PMB).

Figure 4. Phase II Survey Results

GOVERNMENT ASSESSMENT OF EVMS

■ VALUE ASSESSMENT
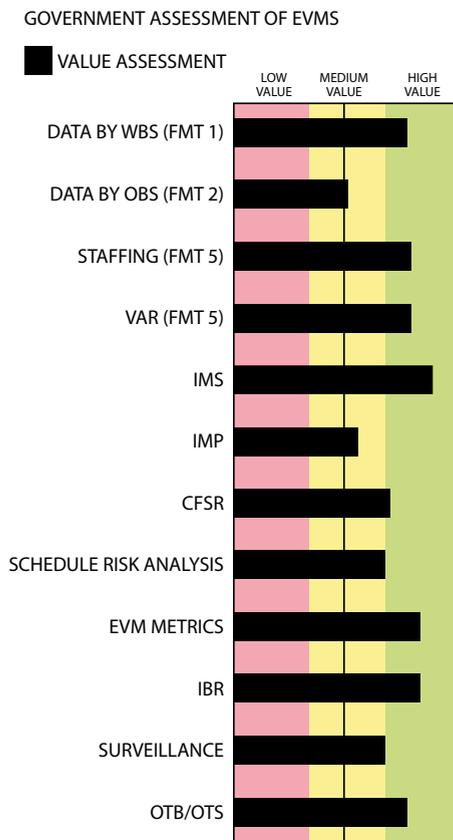
CFSR=Contract Funds Status Report; FMT=format; IBR=integrated baseline review; IMP=Integrated Master Plan; IMS=Integrated Master Schedule; OBS=organizational breakdown structure; VAR=variance analysis report; WBS=work breakdown structure

- Some government PMs do not fully recognize how surveillance can support their need to provide higher quality data (e.g., one PM contends that since he is continually walking the factory floor, he does not learn anything new from an independent surveillance).

Once Phase II was completed, the JSCC relied on government and industry SMEs to integrate the analysis of data collected during both phases of the study. Using a matrix of the Phase I cost areas versus the Phase II EVMS P&MA, the SMEs applied the premise, "The Customer requirement for EVMS Product/Management Practice X can influence Cost Area Y," to determine the direct relationship of a particular EVMS P&MA with a specific cost impact. While the assessments were subjective, the SMEs required consensus on 936 specific matrix intersections and discussed all dissenting opinions to generate the best possible evaluation for each intersection.

As shown in Figure 5, the result of this synthesis shows that each EVMS P&MA is in the High-Value and Low-Cost quadrant. Additionally, analysis of Phase I and Phase II data also indicates that every EVMS P&MA except Surveillance, IBR, and Data by WBS shares 100 percent of its associated cost impacts with other P&MA (Figure 6). This means that even though a particular product such as Data by OBS may have a lower government value, the elimination of this product will most likely have a

Figure 5. Products and Management Activities Cost and Value

COST IMPACT OF EVMS VS. GOVERNMENT VALUE OF EVMS

Defense AT&L: January–February 2017
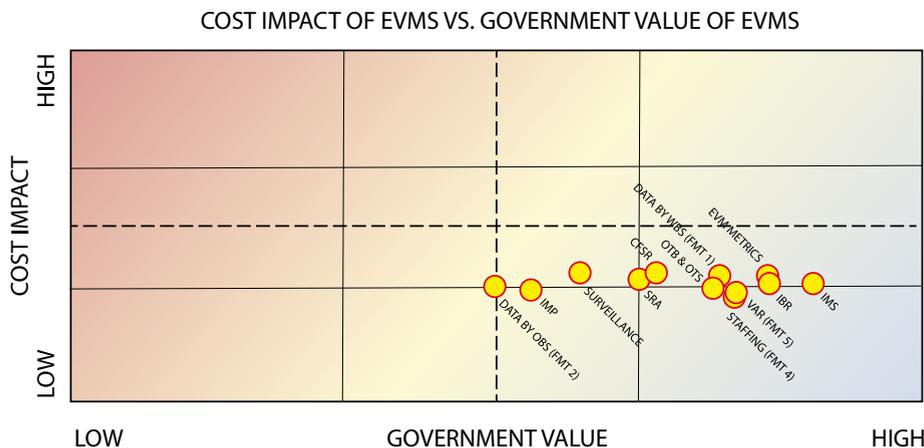
Figure 6. Shared Versus Non-Shared Cost Impacts
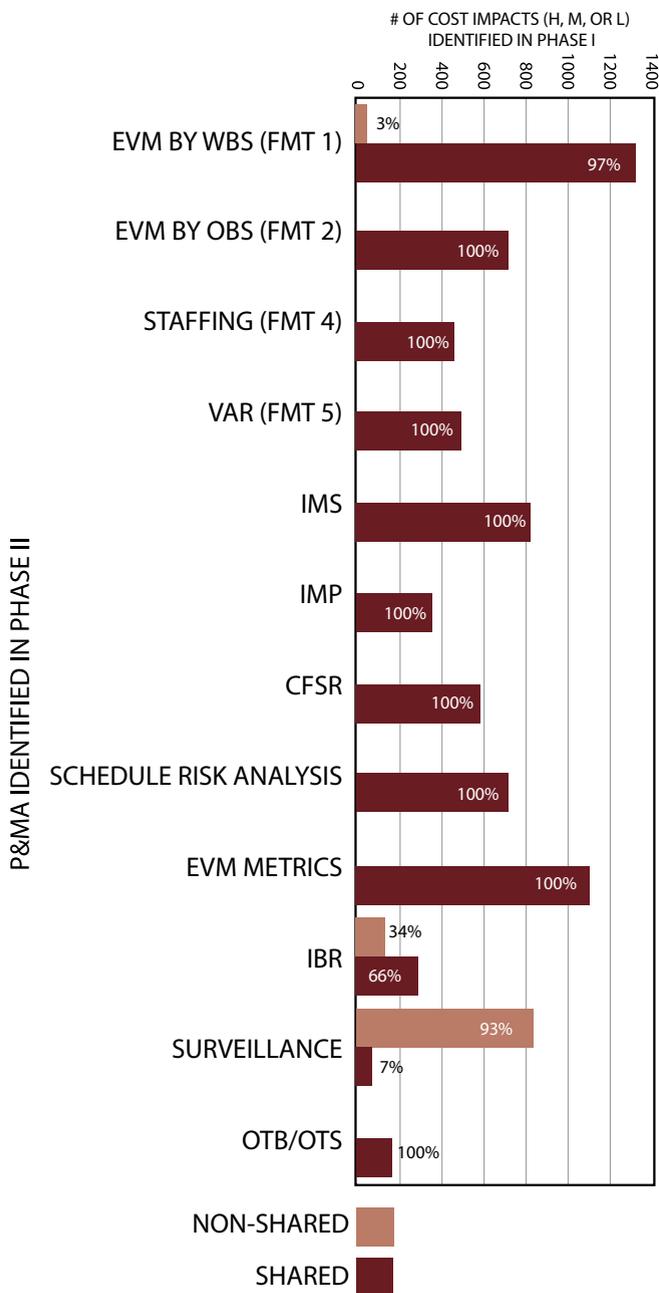
So what does this mean in terms of the cost of EVMS? Since contractors could only provide level of cost impact instead of specific dollar values in the JSCC study, it is difficult to give an exact answer. However, if CLT is considered the "Gold Standard" regarding the cost of EVMS, the JSCC study is fairly definitive as to why the cost of EVMS on cost type contracts should be significantly less than the 0.9 percent identified in 1994.

First, during the 1990s, CLT based its results on a DoD-mandated C/SCS, while JSCC assumes that industry owns EVMS and considers it to be a best practice on all types of efforts (not just government cost-type contracts). Second, CLT incorporated all aspects of the costs of establishing, maintaining and using C/SCSC, while the JSCC study was established to identify the "delta" cost impact for EVMS on government versus other contract efforts (assuming the contractor already has an EVMS management system in place). This means that the cost impacts identified by the JSCC represent only a portion of those identified by CLT. While the JSCC recognizes that there is an expense associated with designing and implementing an EVMS management system, it is considered a one-time non-recurring expense that should not be a liability to the government since a company should have some type of management control system in place to operate. *In* his 2010 publication, *Earned Value Management: A Global and Cross Industry Perspective on Current EVM Practice*, Dr. Lingguang Song stated that 69 percent of his 420 studied groups voluntarily used EVMS. This leads us to think that a growing A&D company will implement EVMS not only to support future government work, but because it is the most prudent thing to do for a self-organizing, competitive and profit-driven enterprise.

The bottom line is that there is no smoking gun to show that removing EVMS requirements from a government cost type contract will result in substantial cost savings. While the JSCC study does show a few higher EVMS-related cost impacts for a handful of programs, it does not identify any systemic High or Medium Cost impacts that affect a majority of the programs that participated in the survey. In almost every case where higher cost impacts do exist, they are typically driven by specific contract requirements.

When there is suspicion that high EVMS implementation costs exist on a program, several questions should be asked before drawing any conclusions:

Does the contractor use EVMS to manage? If so, is the contractor using its management system to support commercial, fixed-price, or internal efforts? Why will it be more expensive on a cost type contract? Ask for specific details. Identify the key cost drivers and obtain a basis of estimate.

If surveillance is identified as a key cost impact, what is the driver? Before discussing the cost of surveillance, what is a reasonable and appropriate level of corporate investment versus direct program cost in the maintenance of EVMS? Do

limited effect on reducing the cost of EVMS since its associated cost impacts will still exist on other P&MA.

Although the JSCC performed its study solely on space-related programs, the contractors who participated in Phase I are the same industry partners who build and deliver systems across the federal government. Likewise, many of the PMs interviewed had experience working in other commodity domains outside of space, representing civil agency and/or DoD environments. Therefore, the JSCC study results arguably apply to any acquisition domain.

industry and the government have the same expectations for EVMS and consistent interpretation of the guidelines? Periodic independent surveillance with timely resolution of issues is part of implementing a reliable and healthy management system.

If the IBR is identified as a contributing cost impact, what is the driver? How many people will be involved to support the review? How will their time be spent differently from normal day-to-day program management execution? Developing a program baseline is critical regardless of whether or not an IBR is scheduled.

If there is a request to eliminate the EVMS requirement or some aspect of EVM that is already on contract, what credit will be given back to the government? If a specific requirement, management activity or report is eliminated, will there be an actual reduction of cost and personnel on the program? Are those individuals identifiable by name? If something is removed from a contract, the government should expect to pay less.

Have both government and industry PMs reviewed ways to decrease the cost impact and/or increase the value of EVMS? Is the size and number of CAs optimized for risk and span of control? Are PMs aware of additional costs created by unique reporting requirements? Have PMs read and reviewed the results and recommendations of the JSCC study (available at www.acq.osd.mil/evm/resources/Initiatives.shtml)? This study provides practical recommendations and stakeholder actions to reduce costs and improve value, and may be helpful in identifying additional EVMS efficiencies.

Admittedly, using earned value to manage a program is not as glamorous as flying jets or working launch operations. However, the JSCC *Better EVMS Implementation Study* offers objective evidence that when EVMS is properly maintained and the data is optimally used, EVMS provides a high-value and low-cost management practice that (1) supports the delivery of valuable systems to the warfighter and (2) helps protect the American taxpayer from wasteful spending. 🖾

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A **Practical PM Guide** to Requests for Equitable Adjustment

Lt Col Scott Klempner, USAF

My first experience with a request for equitable adjustment (REA) was brief and decisive. The O-6 program director didn't literally drop it in the trash bin, but he clearly wanted to. His message to the development contractor was to not expect any action by the government, despite the contractor fastidiously mentioning it month after month on a chart listing unresolved contracts business. The REA resulted from a technical disagreement between the contractor and the government regarding how

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much in-scope testing was required to properly resolve a spacecraft test fault.

According to Federal Acquisition Regulation subpart 43.2, a contractor requests equitable adjustment—essentially a type of proposal—in response to a unilateral contract change order, but other unplanned changes to contract terms, such as a late delivery of government furnished property (GFP) or disputes over scope, can lead the contractor to send an unexpected REA. In the daily life of a program office, REAs are rare because planned contract changes are accompanied by requests for proposal. Likewise, when the contractor and government agree about an unplanned change, the program manager (PM) would treat the REA similarly to any other proposal. However, when the REA results from disagreement on contract terms, delay of work, or scope (either in type or magnitude), the working relationship may become tense if it isn't tense already. Both the government and contractors must weigh issues of fairness

The willingness of the associate contractors to work with each other would quickly degrade if they distrusted the government to enforce the assumptions and terms of each contract.

and duty to stakeholders when deciding how to proceed. Decision making may become emotionally charged, to the detriment of the relationship and program progress.

In the situation described above, the REA was a small blip that did not threaten the program's overall success—we had an enormous cost-plus satellite contract and recognized the need for all parties to work together to get the spacecraft to the launch pad. The issue slowly died and eventually went away. In that instance, it wasn't a bad strategy for the government, but it was not the ideal learning experience for a young field grade officer on how to deal with the situation in the future.

Years later I joined an Acquisition Category (ACAT) I equivalent, open-architecture development program using multiple fixed-price contracts with interdependent (but competing) developers. Team members knew going in that we had the perfect environment for spawning REAs. Not only does the government have a duty to respond to contractor requests for adjustment, but unlike my previous experience on the satellite development program, here even a modest REA had the potential to derail the program. The willingness of the associate contractors to work with each other would quickly degrade if they distrusted the government to enforce the assumptions and terms of each contract.

The actions a contracting officer takes to respond to an REA are clearly outlined by the FAR and Defense Federal Acquisition Regulation Supplement, but nothing similar exists for technical evaluators. The standard process for evaluating reasonableness of proposed costs is meaningless if there is no way to analyze whether claimed impacts were in scope in the first place. When the first REA arrived from my open architecture integrator for "low-quality GFP," we looked for standard guidance on how to handle REAs. Finding none, our team developed a methodology to determine whether REA claims had merit. Taking the contractor's claim seriously and conducting a dispassionate analysis keeps the interactions professional and de-escalates emotions. Defining an objective process upfront increases acceptance of the result and perhaps more important, it shows that the government is exercising due diligence.

The process we developed includes a flow chart (Figure 1) and a six-step evaluation methodology. It is intended for PMs and action officers conducting a technical evaluation of merits and quanta of the claims and complements the contracting officer's evaluation.

The six steps in the REA evaluation process are:

Step 1: Establishment of facts. List all of the claims made by the contractor and sort them into facts the government agrees with upfront and those which require further substantiation. Statements about which the government has no direct knowledge or a conflicting opinion should not be agreed to upfront. Usually the chain of events can be agreed upon by all parties, but a claim that GFP was inadequate (for example) will require supporting evidence. It's the contractor's responsibility to provide such evidence.

This step forces the government to articulate and understand what exactly the contractor thinks happened, what it wants, and on what grounds. It establishes the major issues of the REA. It defines the points the government must address in the analysis and for which the contractor must provide support.

Step 2: Examination of scope. The contract statement of work (SOW) may or may not be very specific. However, in a scope dispute, all relevant paragraphs must be brought forward and

Figure 1. REA Evaluation Process

REA received

DFARS 243.7002 compliant — YES → Legal Merit[1] — YES → Tech Eval on merit/quanta[2] → Independent executive review[3]

DFARS 243.7002 compliant — NO → PCO issues Gov't finding[4]

Legal Merit[1] — NO → (down)

PCO issues Gov't finding[4] ← NO — Claim has merit & price>$0

Claim has merit & price>$0 — YES → Funds available — NO → ID funds or descope options

Funds available — YES → Award

ID funds or descope options → Award

Contractor response:
- Revise/resubmit REA
- Negotiate gov't decision
- Withdraw REA
- Initiate claim

Notes
1. Legal review includes attorney participation—common clauses: government property, stop work, government delay of work
2. Six-step evaluation process, including fact-finding and offsets
3. Originally reserved for claims >$250K, later applied to everything
4. Must include evaluation summary for a denial; courtesy for favorable finding
4. PCO=procuring contracting officer

considered against the claims. It's helpful to quote all relevant SOW language and contractual clauses directly in the writeup to facilitate the work of other reviewers.

This is where program management needs to confront the truth of how a contractor could have ended up performing out-of-scope work. Going for a quick and easy kill on scope by broad-brushing the topic will not satisfy anybody, and it probably won't stand up to legal scrutiny, if it comes to that.

The evaluator should use the relevant contractual language to conclude whether the work was out of scope. If all parties agree on this point, say so. If not, the reviewer needs to present a more detailed argument as to why the work was in scope or not.

Sometimes comparison with the text isn't enough. The quality or condition of GFP may not be explicitly defined in the contract, but it's not an excuse to stick the contractor with the added cost of dealing with unreasonably low quality GFP. Contextual factors such as proposal assumptions, reasonable person tests and possible interpretations should be discussed.

Step 3: Review contractual direction. A contractor cannot self-generate out-of-scope work. After the contracting officer gives authority to proceed, there is a presumption that all tasks started are in scope. It is critical to examine all relevant formal and informal communication between parties. For the benefit of reviewers, list communications such as letters and emails and summarize what was said. Conclude whether the contractor requested direction and if direction was provided by the contracting officer.

Step 4: Substantiate all claims. If it is the program's first REA, the contractor may not recognize the need to provide any evidence in support of the REA's claims. My contractors built REAs just like any other proposal: They predominantly were written by the business team focusing on cost data and pricing labor hours, so the impact basis of estimate was well supported. Justifying the claim was given cursory treatment by contracting staff, if not ignored completely. Resist the temptation to handle this in negotiations—making the contractor write down its justification will force it to think matters through.

By this point, looking at scope and contractual direction should give the action officer an idea about where the evaluation will end up, but it is still necessary to analyze any evidence provided by the contractor. Analyze the logic and applicability of arguments and contract interpretations. If the REA justification is weak or nonexistent, be clear in the writeup about what is missing.

Step 5: Minimization. The contractor has a duty to minimize out-of-scope work and perform in-scope work first. When operating where REAs are being generated, the government PM needs to embrace this principle—it provides the only downward cost pressure for an REA. Contracting normally relies on competition or negotiation backed up by engineering expertise to secure fair prices for the government, but REAs have no such protection. If the contractor allows out-of-scope, unnegotiated work to occur in place of negotiated work defined by the SOW with the expectation that it can be reimbursed through an REA, the government has lost control of the program.

Another consequence of minimization is that negotiating an REA is not simply a matter of negotiating actuals. For example,

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if the contractor decided to perform the work with Level 5 engineers but could have used Level 3s, the government is fully justified in taking exception. If this were in-scope work, cost would have been controlled first by negotiation and then by cost incentives. With an REA, the minimization principle is the primary lever.

From a practical standpoint, this step is an extension of the previous one. However, there is value in keeping this step separate so that a reviewer can easily see which costs were substantiated in Step 4 and what incremental adjustments were made in Step 5.

Step 6: Reciprocal consideration. If the government has any reciprocal or offsetting equitable adjustments against the contractor, this is where positive and negative dollar amounts cancel each other out to produce a lower or zero net payment. Theoretically, the government could press that other claim against the contractor separately and receive funding back (similar to a descope proposal), but this is so rare I have never seen it prove worth the effort. Despite this, the government should never give up leverage on contractor performance—it is still valuable.

Where the contractor refuses to drop the REA, a trade gives the contractor PM something to sell to his or her corporate management. The trade doesn't need to be dollar exact—the flexibility afforded by negotiations could allow the contractor PM to make the trade fit even when the amount supported by government analysis is lower than the contractor's original request.

Gray Areas

The REAs my team dealt with generally fell into two categories—some sort of problem with GFP or proposal assumptions being violated. We spent many long evenings weighing various factors to determine how much liability fell in the government's corner.

In one case, our contractor started in-scope work and continued working even past the point where the contractor considered it to be out of scope. The contractor received a buggy GFP software delivery for integration into the weapon system, but the software code required extensive troubleshooting, repeated attempts at integration, and integration of multiple drops once the software was fixed. Although the work was in scope, they made a good point that they didn't sign up for unlimited integration costs in their fixed-price proposal. Nobody knew what constituted a reasonable upper limit, but we all theoretically agreed one existed. In this case, the auto-generation principle decided the way forward: As soon as the contractor thought work was out of scope, it should have stopped and requested direction before proceeding. Finishing work, later deciding it's out of scope, and submitting a REA is irresponsible.

In another instance, low-quality GFP also caused the contractor to work less efficiently than it had bid. We all agreed it

would have been impractical to request direction. The contractor had a fairly strong case when this happened, except that the SOW, not proposed price, determines the limits of scope. To allow otherwise is to reward the contractor for low-balling the bid. This is especially true if the bid was competitive (it was) and the GFP condition is not documented in the contract (it was not). At the end of the day, the government met the letter of the contract. The argument was bolstered with an "experienced contractor" standard—an experienced bidder should always expect some level of integration difficulty.

In a final case, a subsystem provider underbid the amount of integration support (software bug-fixes) required for the quality and maturity of their offering. The contractor planned to do this work during system integration but did not win the integrator contract, putting all parties in an awkward position. In pushing the contractor to comply with the SOW and continue bringing the subsystem up to specification, we discovered the practical limits of fixed price contracting. The contractor sent an REA claiming the extraordinarily high amount of support required exceeded its interpretation of the SOW. This REA did derail the program, and we were at the point of deciding between litigation and finishing the weapon system. The government sustained the request and finished the system.

The Big Picture

Although supporting an REA is disadvantageous to the government, the objective of this process is not to summarily crush all REAs. It was designed to produce a transparent position all parties can understand. Sometimes even airtight logic isn't enough to satisfy the contractor. They are accountable to corporate management, financial, and shareholder concerns and may not be free to simply drop an REA if the corporation sees a reasonable chance of success. Although the REA disposition is unilateral, the contractor can always initiate a legal claim. A thorough and well-reasoned government analysis decreases the likelihood and success of litigation.

When it comes to building a weapon system, contractor and government PMs are in it together. The contractor's decision to send an REA and the government's disposition both take place in the context of the larger relationship. I have seen government PMs give away the farm in the interest of maintaining a good working relationship, and I have seen working relationships degrade to the point of yelling phone calls and slow progress. It's important to navigate between extremes with full understanding of the short- and long-term costs of a decision to support or reject a contractor's request for equitable adjustment.

The views expressed in this article are those of the author and do not necessarily reflect the official policy or position of the Air Force, the Department of Defense or the U.S. Government. &

Getting the Capabilities Right

The Next Generation of Air Force CBRN Protection

Alexander R. Slate
Maj Charles O'Connor, USAF

Time after time, we try to develop what we think is the next evolutionary leap forward in systems and end up with a product that is a rather slight improvement and not the game changer we expected. Even more alarming, we sometimes lose sight of the real need in chasing the item itself. The examples provided are chemical and biological protection systems, but the concept is applicable across defense acquisition. Sometimes we need to step back and take a second or third look at program assumptions and figure out whether we think what we are doing makes sense in a context larger than the program itself.

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There is no such thing as warfare without casualties. In years past, in many people's minds, the "at-least unstated" rule in chemical, biological, radiological and nuclear (CBRN) protection was that chemical casualties were not allowed. This meant protective gear and processes were necessarily bulky and hot. We haven't stopped and asked ourselves, "How many casualties have been caused by the loss of operational effectiveness while wearing this gear?" CBRN protection affects all the Services in different ways. This article focuses specifically on the Air Force and how requirements have traditionally been met.

The Problem

While both chemical and biological warfare go back a long way, modern CBRN begins with the chemical warfare of World War I. With the advent of cyanide gas and nerve gases, the levels of lethality increased greatly. As a result, levels of protection also increased. But at what cost?

As an enterprise, bulky and thermally burdensome protective garments have become the norm, along with protective masks that greatly restrict vision and head mobility. This protective gear interferes with accomplishment of mission objectives. The impact is exacerbated in warm to hot weather in which there is a great reduction in the work that can be done before thermal stress sets in.

It is time to consider the future chemical and biological agent protection that our soldiers, sailors, airmen and Marines will need and how to provide that protection. Historically, there has been an incorrect focus on what constitutes important system requirements. We've been acting as if chemical and biological protection is the mission instead of understanding that protection is only a characteristic that allows our personnel to accomplish the mission under certain specific conditions. Phrased differently, we have been emphasizing the wrong system requirements.

When the Joint Service Aircrew Mask (JSAM) program started more than 15 years ago, it was meant to be a single mask design for all aircraft. This lofty goal proved a bridge too far, and only the JSAM-Rotary Wing (RW) mask will be a system similar to the original vision. The JSAM-Strategic Aircraft (SA) mask will adapt a ground crew mask for aircrew use but will not provide the ability to transition to and from a fully protected posture easily as originally hoped. Finally, the pilots of tactical aircraft essentially will fly with the same masks they have used since the 1980s, with marginal increases in capability and possibly greater limitations on combat effectiveness in certain scenarios.

The Joint Service–Lightweight Integrated Suit Technology (JSLIST) program was a milestone in its day; both for how it was managed and for the testing methodology and technologies derived from it. Despite the improvements in the acquisition and testing of the new JSLIST system, the actual product delivered to the warfighter brought only marginal physiological burden and mobility gains. It did introduce suits that could be laundered, but 20 years later we are preparing to abandon that idea. In the end, JSLIST offered no significant improvement to the warfighter's operational capability.

The JSLIST and JSAM taught us that systems acquisition is severely limited by initial assumptions. This is compounded by acquisition professionals lacking the proper and appropriate testing protocols, modeling and analysis to achieve the warfighter's goals. Continued testing followed that looked for the same thing each time and only yielded minor improvements in the systems fielded. In a sense, the old adage applies: "The definition of insanity is to do the same thing over and over and expect different results." Perhaps the most damning assumptions are that any "improvement," no matter how small, is better than nothing and that we need to field something new.

Twenty years of effort on the JSAM program for tactical aircraft and the discussions involving the Uniform Integrated Protective Ensemble II requirements (the proposed replacement for the JSLIST) led to the realization that the CBRN Acquisition Community had taken the wrong approach to CB protection. For many years, program management teams questioned the necessity of specific system requirements—such as the ability of aircrew systems to survive a 600-knot ejection while maintaining the same chemical protection as a brand-new system. But it goes much deeper and is more fundamental. Someone else (not the authors) recently said, "CBRN is not a mission; it is an environment in which we need to perform the mission." CBRN defense is not a mission, but it should be an enabler. Instead, today it is one part enabler to two parts stumbling block.

Mission Impact

If the disadvantages are parceled out evenly—when both sides in a conflict are subject to the same burdens and disadvantages in using these types of weapons—the limitations previously discussed would not pose such a great problem. However, the United States and most, if not all, of its allies eschew use of this type of weapon. As a result, the disadvantages mostly are one-sided.

The focus of CBRN protective requirements should therefore be on mission impact. For air power, the most telling element of mission impact is the number of combat air sorties generated. Reducing combat air sorties by just 10 percent has a very real and tangible battlefield impact. Lowering combat effectiveness to the 25 percent to 50 percent range severely hampers a commander's ability to deliver airpower when and where it is needed. But it isn't only a matter of the number of sorties. If we also decrease the level of mission effectiveness or a pilot's required endurance to conduct a sortie, we have magnified the effects of reduced sorties generation.

"Pouring the Foundation" for Requirements Generation and Analysis

So, what is required for future CBRN acquisitions? We first need to realize the extremely low likelihood that we can prevent all casualties from CB hazards. This means that an honest

discussion is needed among stakeholders to determine an acceptable loss rate. Acceptable loss is not limited to deaths but also loss of combat effectiveness, although fatalities should be considered as well.

How much reduction in effectiveness can be tolerated? How can we accept that decrease of effectiveness during the combat sortie mission, the number of sorties that can be generated, or a mixture of both? What will be the mode of the decrement—task inefficiency or casualties? In considering what level of casualties might be "allowable" (as opposed to "acceptable"), casualties come with special costs—emotional impacts on surviving crews, public reaction and the cost of personnel and supplies needed to care for the casualties.

The next need is to understand the existing protective capability of the regular duty uniform gear and aircrew flight equipment. Given current operational constructs and hazard expectations, what types of casualties would be experienced in the absence of CBRN-specific protection equipment? What kind of exposure could our personnel survive before moving into the zone of unacceptable risk? Next, could we change our tactics and procedures to reduce personnel risk and casualties to a more acceptable level? What operational effectiveness is produced by these changes? Suppose only the normal duty uniform is worn, augmented by a protective mask?

Following this discussion, we need to decide whether to proceed with a material solution. Even if it is determined that a material solution is needed, the results of the analysis to the aforementioned questions of operational effectiveness must be kept and used as the baseline state to compare with a new material solution. When the material development process is completed, the levels of operational risk and effectiveness should be compared to the "baseline" results to determine if the devised solution was a success and should be fielded.

Protective Mask Considerations

What are the issues with protective masks—in particular for aircrew personnel? The key performance parameters (KPPs) in the most recent aircrew capabilities document focused on the chemical and biological protection afforded by mask and filter. The masks provided the desired protection. However, the problems posed for the Air Force are not matters of chemical or biological protection. Rather, the problems revolve around performance, including the ability to prevent pressure spikes due to rapid decompression during descents from higher altitudes, the masks' restrictions on head movement and the wearer's ability to even see cockpit control displays as well as the outside environment and the resultant effect on situational awareness. There also are broader issues when the bulkiness of the mask portions below the neck interfere with finding and safely operating emergency controls.

To a lesser but very palpable degree for pilots, there is the discomfort of continually wearing the breathing mask sufficiently secured to provide protection during an entire mission set in

aircraft operating at high acceleration—rather than being able to loosen the mask during regular, noncombat flight. In other words, the mask's performance characteristics can affect "flyability" and flight safety.

The rigidness and assumptions of the stated KPPs drive design elements to meet protection requirements at the expense of lesser key attributes (the ability to fly the plane). In the case of any other piece of equipment on an aircraft, these lesser key system attributes are KPPs. So why is that not the case for CBRN aircrew masks?

Protective Clothing Considerations

Protective clothing is simpler to understand than aircrew protective masks. Beyond protection levels, there are three somewhat interrelated primary concerns regarding protective clothing: bulk, mobility, and thermal burden. The fourth aspect is cost (which, though unstated, also is a consideration regarding protective masks). And cost brings into play a number of other technical aspects such as durability, service life and shelf life.

Aircrew protective ensembles are a bit easier than those for the ground crew because mobility and durability concerns are less strenuous in air-crew clothing. In the case of thermal burden, the chemical protection is not the worst contributor of heat stress compared with existing aircrew life-support equipment. Pilots have equipment layered on top of their ensemble and a good portion of their torsos are covered by the metal, plastic and fabric of the cockpit seats. In addition, the aircrew's exposure to a threat that could penetrate the skin would be greatly reduced by the closed cockpit.

The ground crew is a different matter. Here balancing protection and other aspects is trickier. Ground crews are much likelier to be exposed to a potential threat over a longer time. The required range of motion for ground personnel also is much greater. And for many specialties, the plain, normal and everyday physical hazards posed to the suits are much greater. For example, firefighters deal with high heat and flame, civil engineering personnel deal with rough material, and aircraft maintenance face the tight quarters and snag hazards found in relatively small maintenance hatches.

Conclusion

This article has touched on a number of different concerns, but an in-depth analysis is needed to deliver the capabilities required in future operations. This article is offered to foster discussion and generate thought. The last 25 years have seen only relatively small incremental improvements in CBRN equipment. Protection factors have increased, but very little has been done to improve our ability to "Fly, Fight and Win" in a CBRN-contested environment. In fact, at this juncture, CBRN protective equipment is a mission hindrance. It is time to change that, to start over from basic past assumptions and re-evaluate the idea of acceptable risk. It is necessary that we do so!

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The Seven **Lethal** Acquisition Diseases

Brian Schultz

"Extreme remedies are very appropriate for extreme diseases."
—Hippocrates

t's no secret that Department of Defense (DoD) acquisition professionals work in a very challenging, high-pressure environment. The acquisition process involves an integrated product team of diverse functional experts who must employ critical thinking skills, collaborative problem-solving and robust communications to be effective. This dynamic means that the acquisition team's behaviors often can be critical factors in a program's outcome.

During a defense acquisition and industry career spanning more than 35 years, I have observed and participated in both high- and low-performing acquisition teams. The poor performing teams consistently adopted behaviors that I believe contributed to their poor performance while the high performers avoided such behaviors.

The article identifies some poor team behaviors that should be avoided. Each of the behaviors is identified as one of the seven lethal acquisition diseases. On the contrary, the behaviors of the high-performing teams are identified as potential remedies for those afflictions.

"Throw-it-Over-the-Fence-itis"
The throw-it-over-the-fence disease involves a lack of teamwork and collaboration. Developing acquisition alternatives, plans and documents should involve a collaborative effort to get the inputs from functional team members. Asking for inputs on important documents with no subsequent dialogue is a symptom of this disease.

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I observed a classic example with a contracting organization I once worked with. This contracting organization required a list of completed documents before any contracting actions were taken. The well-intentioned rationale was that the program office needed to define the technical scope, base line requirements, and have funding documents available to ensure that the contracting officials were not wasting their time before a procurement package was initiated.

The problem was in implementation. The contracting staff resisted upfront dialogue and early planning discussions because the checklist of completed documents was unavailable. It eventually instilled an attitude of sending documents to each other without discussing key issues, many of which had contractual implications. As a result, communications and collaboration were stifled and teams neither effectively planned nor developed an integrated strategy. A senior leader intervention was needed to stop this behavior and change the process since the situation created an atmosphere of finger pointing and mistrust between the teams.

The remedy? Program managers (PMs) should establish clear expectations for collaboration and team coordination, especially for important program artifacts. Not only will the product quality improve; the quality and performance of the team also should be enhanced. As an example, in our Defense Acquisition University (DAU) Services Acquisition Workshops, we ask that the contracting officer, PM, subject-matter experts and other key team members participate in the entire event.

"Ready-Fire-Aimitis"
This disease involves a team that rushes through tasks without completing key parts of the task or adequate planning. This is a prevalent disease because we are tempted to avoid possibly tedious and time-consuming in-depth planning. A good example is not fully addressing some of questions raised by potential bidders about the draft Request for Proposal (RFP). I have observed teams answering such questions with a mere restatement of the draft requirement. This not only ignored the question but sent a message that the company questions were unimportant. This can result in limited competition, a single bid or even a protest. None of these outcomes is good.

On the industry side, I watched our business unit become too aggressive in chasing new business. We pursued numerous opportunities, many of which were low probability wins since we were either late to the game or did not fully understand the customer requirements. After some reflection, we changed the model to establish more focused and better-informed pursuit decisions. As a result, our win rate increased and our business unit performance exceeded objectives.

The PM can remedy this disease by establishing a clear expectation of robust planning and avoiding the rush mentality. Moving forward from one step to the next involves successful completion of necessary predecessor events and understanding task relationships. In the draft RFP example, the PM should

insist that all questions are answered satisfactorily before a final RFP is developed and released. Establishing a culture of high-quality tasks and documents is another good remedy.

"Cut-and-Paste-itis"
Overuse of cutting and pasting is a symptom of the actual affliction—a lack of critical thinking. While reusing some content can help save time and capture complex concepts, this should not serve as a substitute for thinking through the problem and developing content that enables the best solution.

I worked in a program office that was accustomed to issuing sole-source contracts to the original equipment manufacturer. This sole-source situation was driven by a very complex and unique weapons system configuration and lack of data rights. When it was time to conduct an acquisition strategy, the language to justify a sole-source approach simply was cut and pasted from the last contract action and was rarely questioned. After discussions with another company, we decided to challenge the status quo and quickly learned that not every modification to the aircraft needed to be sole source. We explored some limited competition and began looking at actions to migrate to a more open architecture, enabling even more industry participation and competition.

The remedy for this disease? Apply a disciplined and rigorous thought process when developing important work products for your program. Be careful to avoid cookbook solutions that may not be the best course of action for your situation, even if they worked previously. Conditions will change. Emphasize critical thinking skills to your team, and lead by example.

Critical thinking is one of the fundamental (and more important) skills that acquisition professionals must employ in order to plan and execute programs. There is no one-size-fits-all approach to analyzing a program's unique aspects and making informed decisions. As a DAU professor, I often see students and workshop teams struggle when asked to think critically. This should not be surprising. Just like other skills, critical thinking requires training and practical experience in order to achieve improvement. Critical thinking tools should be part of the acquisition team problem-solving rhythm since it is too important to be performed on an ad hoc basis or ignored. Numerous examples clearly show the benefits of using these techniques.

"Schedule-Driven-itis"
This disease can be highly contagious in acquisition organizations because important program milestones are highly visible and have broad implications for acquisition outcomes. "Time is money" is a common acquisition saying and means that we incur additional costs as schedules slip to the right. Allowing time constraints to drive unreasonable schedules is a root cause of the disease. But be aware of the symptoms.

I was involved early in my career with an advanced voice and data communications system program. This major program

was very visible and it was imperative to get the system through development and fielding to our joint warfighters. Unfortunately, we kept missing major schedule milestones due to developmental issues and redesign work to correct system deficiencies discovered during testing. The DoD PM readily accepted the contractor's get-well plan and revised schedule, even though the contractor's track record was not credible. In the end, the entire team, both DoD and contractor, lost credibility and the program suffered.

The "remedy" for this disease is adoption of event-driven scheduling, including robust schedule analysis. An event-driven schedule will assess a reasonable duration based on

I had the opportunity to observe two users (the United States and an allied partner) of basically the same system diverge in developing a major upgrade to that common system. While the reasons for the divergence included some good reasoning, the end result was two divergent fleet configurations with significant challenges to interoperability, supportability and affordability.

How do we overcome this disease? The remedy simply is to foster a mindset of exploring possibilities. We earlier considered the necessity for critical thinking. An essential part of critical thinking models is exploration of alternatives. PMs should keep an open mind to solutions available from outside
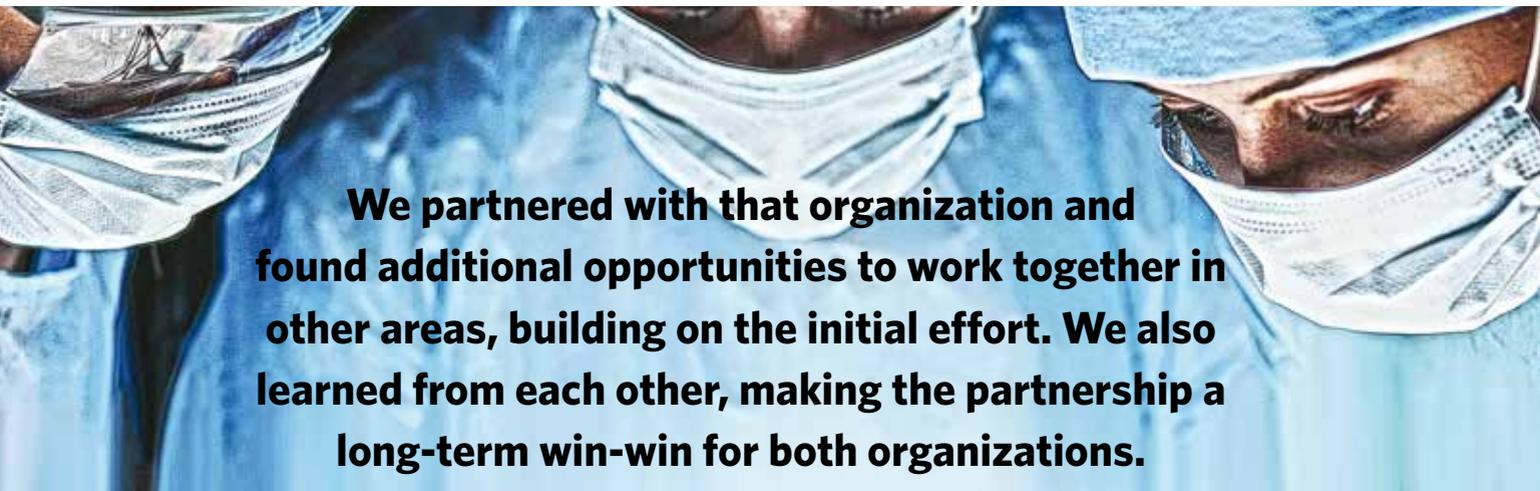
> **We partnered with that organization and found additional opportunities to work together in other areas, building on the initial effort. We also learned from each other, making the partnership a long-term win-win for both organizations.**

task complexity, resources, task dependencies and other relevant factors related to a credible plan to complete the required work successfully. An event-driven schedule mentality recognizes that programs may have compelling schedule-driven milestones and that not adhering to these risks significant consequences. However, the PM and team should assess and understand the risks of signing up to a schedule-driven milestone. Adopting an event-driven mentality will enable informed decision making.

"Not-Invented-Here-itis"
While the symptoms vary, the root cause of this disease is resistance to change. In practice, not-invented-here means that an organization will not use the products, services or processes of others. The organization's leadership may believe it is successful and has no need for outside help. The organization also may believe that the incorporation of external products or processes could introduce risks and even threaten the unit's future workload or survival.

There are many dire consequences associated with this disease, but I believe the primary negative is the duplication of effort from trying to reinvent the wheel. Imagine the cost and schedule implications of developing a new capability that is already available as a production item. On top of these costs, the delay in providing the capability to the warfighter can create an even greater problem.

the organization. I remember an air traffic management system we were planning that used a new sensor technology. The only organization we could find that had expertise in this area was outside of the DoD. We partnered with that organization and found additional opportunities to work together in other areas, building on the initial effort. We also learned from each other, making the partnership a long-term win-win for both organizations.

"Treat-the-Symptom-itis"
The "treat-the-symptom" disease indicates poor risk management and reactive versus proactive management. Managing risk is clearly one of the big areas of emphasis for DoD PMs. Part of risk management is the development of precise future root cause statements. Similarly, for issue management, PMs need to identify the root cause, which may not be easily visible without some examination, often using relevant data to assist. This prevents using scarce resources to manage symptoms that don't solve the root-cause problem. I have observed programs with very elaborate risk management plans that were nothing more than shelfware. When I asked why the plans were not used, the answer was along the lines of "we don't need to use it or don't have the time and resources for this small program."

As an example, I exercised some oversight of a team that had a great track record in acquiring and deploying production

radars in diverse environments for foreign military sales customers. Given their past efforts, why should they waste time worrying about risks?

This same team subsequently had a major customer express dissatisfaction with the performance of their newly installed radar. The surveillance coverage was very limited and did not detect aircraft of interest. It did not matter to the customer that the mountainous terrain blocked the view of the sensor; the program office needed to fix the problem.

In hindsight, robust risk management could have helped the team identify the terrain as a limiting factor in surveillance coverage. As a mitigation, the team should have assessed the siting options, using models to better understand the various alternatives, working with the customer before installation to plan for the best option. This could have helped avoid a costly redeployment of the radar to a more favorable site.

"Conspiracy-of-Hope-itis"

This disease is associated with overly optimistic planning assumptions about a team's ability to execute a program within cost, schedule and performance constraints. Some common symptoms include poor program start-up planning, lack of analytical rigor and heavy reliance on contractor sales pitches of program possibilities.

Several motivations make this disease prevalent and hard to prevent. These include the "can-do" attitude of high-performing teams; a desire to work on high-visibility programs; the wish to keep a team or organization employed and to obtain or justify funding, and many others factors. PMs must be very careful with this disease, which can lead to significant negative outcomes.

An example of a personal experience with this disease involved a significant development effort for a command and control system. This occurred in the days of acquisition lightning bolts that in part called for smaller DoD acquisition program offices with greater reliance on contractor expertise to manage the cost-performance aspects of a program through its life cycle. In this case, the PM and the contractor were extremely optimistic that the joint team could deliver on a very complex development with minimal help from the DoD.

It turned out that the DoD program office did a poor job planning for the contract's scope and complexity. Furthermore, the program office, with its limited team, could not effectively manage the cost-performance trades and keep up with design review and approvals, and this affected the contractor's ability to execute in a tight schedule. The contract suffered significant cost growth and had to be renegotiated to incorporate a more realistic program. Several years and many millions of dollars later, the program recovered, but the optimism lesson lingers.

Treating this optimism disease involves a more complex diagnosis because the root cause needs to be diagnosed before there can be any treatment. Treatment can range from improved program start-up planning and cost estimating to ethics training.

Additional Treatment Considerations

Building an organizational environment of trust, empowerment and integrity helps lay a foundation to avoid these diseases. PMs and their program office leadership team must lead by example in this area and ensure that staff members are empowered to speak up without fear of incurring retribution or criticism. This type of environment is crucial to effective critical thinking; people must be open to sharing ideas and feel that their input is valued.

Some of these PM leadership qualities can be associated with soft skills such as emotional intelligence, critical thinking, change leadership, coaching, mentoring, and managing conflict. Many training courses and workshops are available to develop these skills, including those at DAU. Most of these workshops can be highly tailored to address the specific areas of concern and offer a great opportunity for the acquisition team to reflect on specific actions that can improve performance. PMs should consider these training opportunities and also consider intact team efforts to get the best return on the training investment.

There always is a danger that the seven lethal diseases will become resistant to treatment. It is important to identify the root causes and ensure the affliction is treated promptly so it does not get worse. While treatments usually are effective, good preventive maintenance always is the best approach because it can help avoid the diseases altogether! &

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MDAP/MAIS Program Manager Changes

With the assistance of the Office of the Secretary of Defense, *Defense AT&L* magazine publishes the names of incoming and outgoing civilian and military program managers for major defense acquisition programs (MDAPs) and major automated information system (MAIS) programs. One change of leadership was reported for September and October 2016.
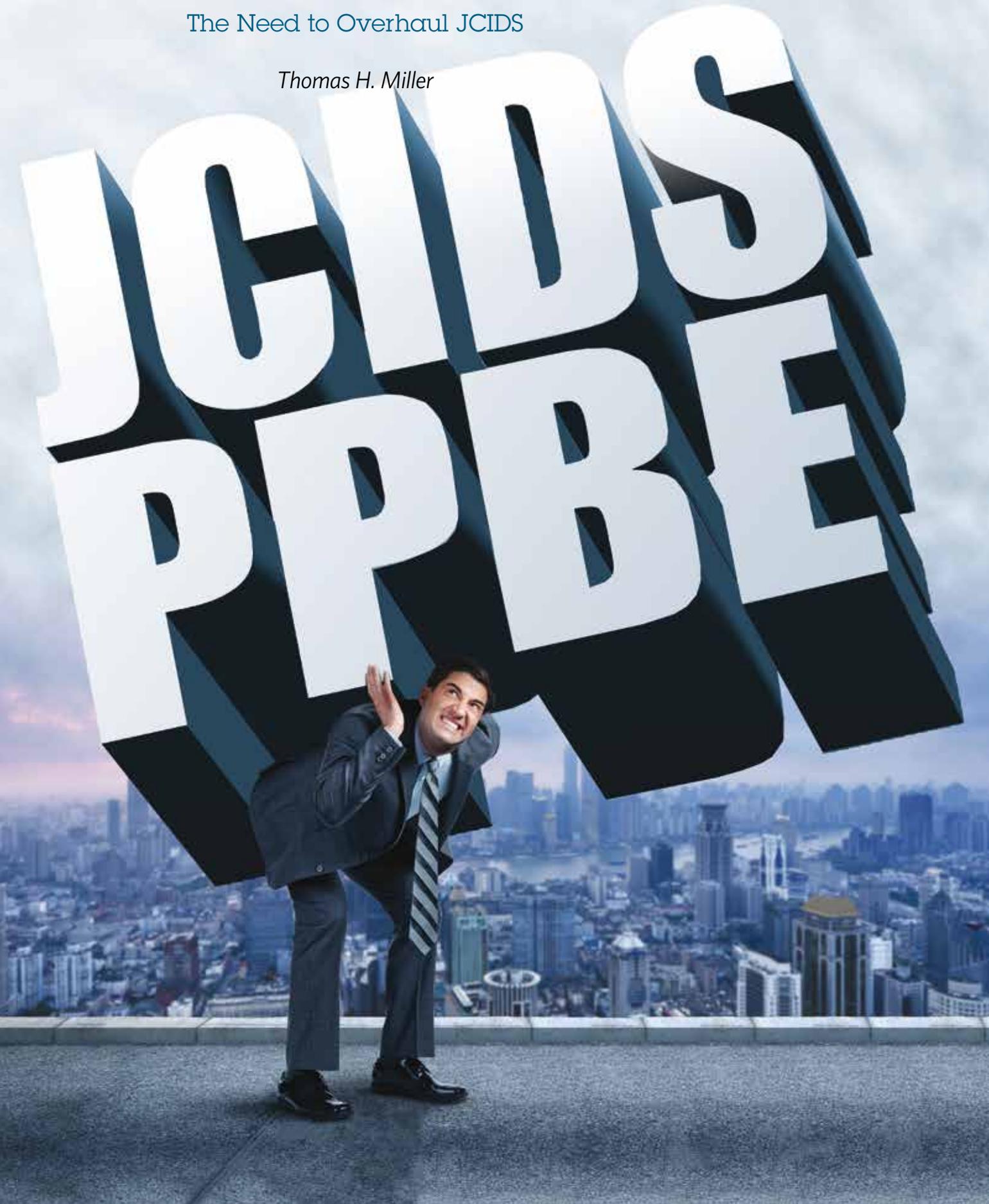
Navy/Marine Corps
CAPT Laura Schuessler relieved **CAPT Scott Porter** as program manager for the Integrated Defensive Electronic Countermeasures System (ALQ-214) Program (PMA 272) on Oct. 14.

Requirements Management

The Need to Overhaul JCIDS

Thomas H. Miller

Acquisition reform continues to receive a great deal of attention from both the Senate and House Armed Service Committees. Reform initiatives to date tend to focus exclusively on the "little a" puzzle piece of the defense acquisition process—i.e., the Defense Acquisition System (DAS).

The other two pieces of the "big A" process—the requirements system (Joint Capabilities Integration and Development System [JCIDS]) and the financial system (Program Planning Budgeting and Execution [PPBE])—to date have had a free pass from Congress; yet these processes share a good portion of the blame for continuing poor results from acquisition programs.

The JCIDS process in particular requires a complete overhaul because it is too bureaucratic and cumbersome to keep up with the speed of the current information age technology development cycle. It has been assessed by Bill Greenwalt of the American Enterprise Institute as "one of the few processes that is even more dysfunctional than the acquisition process"; and described by other authors as "byzantine" and "one of the most inscrutable strands of Pentagon red tape." The Joint Chiefs of Staff offices that run the process are overstaffed, inefficient, and require major streamlining to become more responsive and effective. Michele Flournoy, former Under Secretary of Defense for Policy, said that, "The Joint Staff and the Office of the Chairman have grown to nearly 4,000 people ... the staff should be smaller and more focused on providing advice to the president," noting that bloated headquarters staffs "undermine both performance and agility."

JCIDS was implemented in 2003, at the direction of then Secretary of Defense Donald Rumsfeld, with the intention that it should emphasize joint requirements development and in order to establish an analytical process for identifying potential material and non-material solutions for validated capability gaps. The Defense Acquisition Portal further explains the purpose of JCIDS: "The JCIDS process exists to support Joint Requirements Oversight Council (JROC) and Chairman of the Joint Chiefs of Staff (CJCS) responsibilities in identifying, assessing, validating, and prioritizing joint military capability requirements. JCIDS provides a transparent process that allows the JROC to balance joint equities and make informed decisions on validation and prioritization of capability requirements." Yet, both the Congress and its investigatory arm, the Government Accountability Office (GAO), have questioned whether the system is effective in meeting joint force needs; and the DoD acknowledged to the GAO in 2012 that JCIDS has been ineffective in helping the JROC carry out its responsibilities. What are the specific problems associated with the JCIDS process, and how can they be fixed to produce a nimble and responsive requirements development system that still supports the JROC's Title 10 responsibilities to help the CJCS (1) identify, assess and improve joint military requirements; (2) establish and assign priority levels for joint military requirements; (3) review the estimated levels of resources

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required to fulfill joint requirements; and (4) make trade-offs between cost, schedule and performance constraints?

The following is a short summary of the problems that I see, followed by a very compressed overview of possible steps to make the JCIDS process more effective.

Problem 1: The JCIDS process is too slow and bureaucratic. The process is extremely complex and requires a long series of successive "heel to toe" steps intended to ensure that the analytical and staffing elements of the process are followed and fully documented. "Capability sponsors" (generally, the requirements organizations within the Services, such as the Army's Training and Doctrine Command [TRADOC]), are

requirements documents. Other changes limited page lengths to force concise documents; established staffing targets of 83 (later 97) days for the deliberate process and 15 to 31 days for the urgent/emergent process. Other changes created a more robust "tripwire" process that requires sponsors to return to the JROC for Cost, Schedule and/or Performance slips.

While laudable, it is doubtful that these changes actually reduced the estimated 15 to 20 months required to gain final approval of a requirements document. The complex process continues to drive increased, time-consuming analysis, reviews and staffing within the Services before they submit the requirements documents into KM/DS for JS review. In addition, documents frequently are returned to the Service

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required to create their requirements documents in JCIDS-standard format, gain endorsement from Joint Staff (JS) offices on applicable content (e.g., J4 endorsement of the Energy key performance parameter [KPP]), and then submit the documents to the J8 (Force Structure, Resources, and Assessment Directorate) "Gatekeeper" through the JS mandatory requirements document database, Knowledge Management and Distribution System (KM/DS). In addition, there are several levels of review, including Functional Capabilities Board (FCB) and Joint Capabilities Board (JCB) reviews, before the document even makes it to the JROC. This is particularly true for requirements documents (primarily those that lead to Acquisition Category (ACAT) ID programs) that are designated as "JROC Interest" and that, therefore, require JROC approval.

The JS/JROC staffing and review process is performed in addition to (and generally duplicative of) the staffing and review process within the sponsoring Service. In 2010, Gen. James ("Hoss") Cartwright initiated an end-to-end review of JCIDS in order to improve the process' responsiveness and decision support to the JROC. This resulted in major rewrites of Chairman Joint Chiefs of Staff Instruction (CJCSI) 5123.01—the JROC Charter, CJCSI 3170.01—JCIDS, and the JCIDS Manual in Jan 2012. Changes to the process included creating three potential process "lanes" for different circumstances—the traditional process for deliberate requirements documents, and streamlined review processes for emergent and urgent

sponsor by the J8 Gatekeeper for revisions, often for formatting; restarting the staffing clock. Finally, the expedited review process for Joint Urgent Operational Needs Statement /Joint Emergent Operational Needs is a good initiative, but very few documents will go down these lanes. Better to create a single process that expedites review and approval of all requirements documents.

Problem 2: Hierarchical review slowed by a bloated JS organization. The JCIDS process is hierarchical, with requirements and approvals flowing from the JROC back to the Service sponsors. The sponsor organizations have very little influence on the process, other than through the "Old Boy Network" (i.e., some General Officers who seek to influence their peers on the JROC and/or JCB). This in itself defeats the purpose of independent review.

This process has driven a significant increase in the JS military and civilian organization structure (the overall organic government personnel on the JS exceed 4,000, with an unknown—but probably much larger—number of support contractors).

Many of these people—including the members of the JCB and JROC—lack the technical expertise and experience needed to fully understand the requirements in the documents (the GAO noted that the House Armed Services Committee "received testimony that the Joint Staff lacked some of the analytical ex-

pertise necessary to ensure that the JCIDS process rigorously vets proposed requirements ... and we noted that capability needs continued to be proposed and defined by the Services with little involvement from the joint community"). And the personnel generally are not trained in the acquisition process. All of these factors combine to create an overly bureaucratic, complex process that involves excessive reviews by multiple layers. This ultimately slows the "big A" acquisition process with little real return on this investment in time.

Problem 3: Multiple analytical reviews and KPPs that drive cost and limit trade space. The hierarchical JCIDS process—driven by a risk-averse culture's need for top-down control—has resulted in establishment of a significant number of mandatory KPPs. The "AcqNotes.Com" website defines a KPP as "key system capabilities that must be met in order for a system to meet its operational goals."

KPPs are intended to be kept to the absolute minimum necessary to ensure operational effectiveness, in order to allow maximum flexibility so the program manager can seek the most technically capable, affordable material solution and propose appropriate trade-offs with requirements (KPPs aren't tradeable).

Multiple mandatory KPPs significantly reduce that flexibility, increase cost, and limit access to technical solutions that may provide greater overall capability. There are currently six JCIDS-directed mandatory KPPs: (1) Force Protection; (2) System Survivability; (3) Sustainment; (4) Net-Ready; (5) Energy; and (6) Training. All of these KPPs cause the Service sponsors to spend significant time and resources on analytical efforts for each KPP. Moreover, review and endorsement of each KPP must be coordinated with the applicable JS office.

In addition, JCIDS mandates a torturous capability gap analysis process prior to creation of the first requirements document—the Initial Capability Document (ICD)—culminating in a Capabilities Based Assessment (CBA). This analytical process extends document processing time and consumes significant resources, often into the millions of dollars (many studies are contracted out, of course). But, again, this adds little value to defining the requirements for the ultimate material solution. As Dr. Michael Cochrane has written: "The problem is that the capabilities-based reality has never quite lived up to the capabilities-based theory ... so-called 'gap analyses' are nothing more than highly subjective, qualitative statements ... there is nothing rigorous or analytical about this, so why beat around the bush? If the joint force commander wants more 'x', just ask for more 'x'!"

Problem 4: Too many requirements documents. Preparing the three requirements documents—the ICD, the Capability Development Document (CDD), and the Capability Production Document (CPD)—requires extensive analysis and resources. All three require separate, lengthy staffing/review cycles—again slowing the overall "Big A" acquisition process. The idea behind having three separate documents is that the required capabilities are defined and documented in increasing detail as knowledge is gained while the acquisition program progresses through its life cycle. However, little additional knowledge is gained from developing and staffing the ICD and CDD—at least not enough to justify the resources and time required to staff and prepare the documents. Regardless of the theory, the Service sponsors generally know what material solution they want at time of ICD (and earlier). Working with their acquisition counterparts, the sponsors conduct enough market research to know the capability of the potential systems or technologies available in the marketplace.

Problem 5: JS/JROC review adds little value. The vast majority of the documents reviewed by the JROC and subordinate boards are approved without comment. This is due to several of the reasons cited above, including lack of subject-matter expertise on the JS and a collegial culture that discourages JCB/JROC general officers from disapproving or changing requirements put forward by their peers. Very few of the documents result in JROC memorandums that direct changes in requirements based on trade-offs among cost, schedule and performance constraints, or that direct the Services to seek joint material solutions. The JCIDS process therefore results in spending vast resources and slowing the acquisition and fielding of military equipment. But based on the low percentage of documents disapproved or changed, this work provides a very poor return on this investment in funds and time.

In summary, the JCIDS process' multiple steps and multiple review layers slow requirements document validation to a crawl, while the process itself—as well as the large JS organization that sustains it—adds little toward providing the warfighters with better and faster technical capabilities. The Service sponsors spend months and often millions of dollars complying with the "byzantine" JCIDS process, but at the end the vast majority of the documents are "rubberstamped" in the JS/JROC review.

When he initiated his JCIDS review initiative, Cartwright said: "We're starting to rewrite JCIDS. It has been gamed to death and we're going to throw it away. Unfortunately, they didn't do that. Instead, they have initiated changes that double down on the current model; primarily because the JS JCIDS team—like the proverbial fox guarding the hen house—implemented the changes. I believe that the DoD (and the taxpayer) can get better value—and a much more streamlined requirements review—by taking a few simple steps to streamline the process:

- Reduce JS/JROC involvement to the bare minimum required to meet the intent of Title 10 responsibilities and delegate the remaining authority to the Services.
- Require JROC review of requirements documents only for Major Defense Acquisition Programs (MDAPs), do away with the FCB and JCB pre-reviews, and delegate all other reviews/approvals to the Services.

- Conduct periodic JS/JROC-led portfolio reviews that focus on ensuring that the Services pursue joint material and non-material solutions to capability requirements, and that overall requirements are aligned to strategic, Combatant Commander, and budgetary priorities.
- The Under Secretary of Defense for Acquisition, Technology, and Logistics and the Under Secretary of Defense (Comptroller), and JS Vice Chairman co-chair both JROC and Acquisition Milestone reviews, ensuring active coordination and trade-off agreements between the three "circles" of the "Big A" Acquisition process.
- Allow the Services tailoring of the analytical requirements— particularly CBAs—to the program requirements.
- Replace the current three requirements documents with a single common document, called a Capability Requirements Document (CRD), that is approved once prior to Milestone B, and only updated thereafter as required by fact-of-life changes.
- Eliminate all mandatory KPPs, and make the current six (6) mandatory KPPs optional for use by the Service sponsors as applicable to the specific acquisition program.
- Significantly reduce the number of personnel in the JS organization that support the JCIDS and JROC to a core professional staff that is fully trained and certified in Requirements Management, Acquisition, and Financial Management.

The goal of these changes is to simplify the overall process, push decision authority down to the level appropriate for a risk-informed culture, reduce overall cycle time, reduce requirements development costs, and allow the JS/JROC to focus on their core missions of providing advice to the president and (at a much higher level) prioritizing joint military capability requirements.

The current JCIDS process is typical of the top-down Pentagon hierarchical control processes in force since World War II. Unfortunately, the process moves too slowly to keep up with the light-speed pace of the evolving threats that it is intended to counter and much too slow to acquire and field the technologies required to fill 21st century capability gaps. (As noted by former Air Force Vice-Chief of Staff for Intelligence Lt. Gen. David Deptula, "Al Qaeda doesn't have a JCIDS process … we need to be able to operate much quicker and inside our adversary's decision loop.") In order to make the process more effective in terms of staying ahead of the threat curve, the DoD will need to sacrifice control for speed by allowing the Services more authority to seek innovative solutions and to more rapidly acquire new, cutting-edge technologies (both hardware and software) and get them in the hands of the warfighter.

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Take a **Deep Dive** With DAU

The Kind We Offer Is Safe and Sure to Keep You Dry

Woody Spring ■ *Rebecca Haydu-Jackson*

A technical deep dive for a submarine may involve carefully characterizing submersion depths that approach the performance limits of hull integrity or other system limitations. For a scuba diver, a Deep Dive could be better understanding the capabilities and limitations of human performance or the depth at which nitrogen narcosis begins to set in.

Spring, *a graduate of West Point and former NASA astronaut, currently works at the Defense Acquisition University West Region in San Diego, California, as a professor of Engineering, Test and Evaluation, as well as chief learning officer and an executive coach.* **Haydu-Jackson** *is a former contractor supporting DAU West Region. She completed her coursework toward a master's degree in business administration and has since left DAU for other employment.*

Figure 1. The DAU Acquisition Learning Model
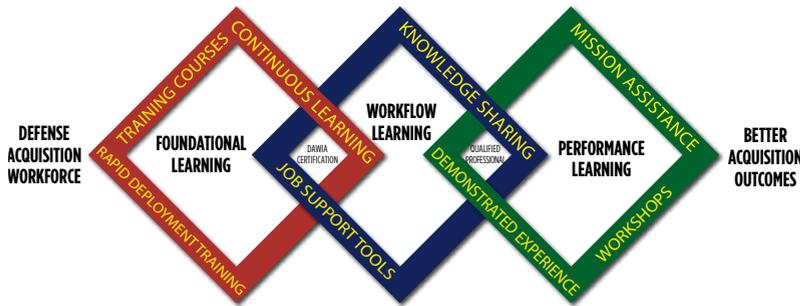
Foundational Learning
Deliver high-quality, current, easily-accessible acquisition training, providing long-term knowledge and critical thinking skills.

Workflow Learning
Provide customer-focused learning assets and job support tools, at the point of need, to help the Defense Acquisition Workforce succeed.

Performance Learning
Conduct wide range of workplace support including high-impact customer engagement to help improve acquisition outcomes.

DAU professor who describes the ALM either in class or in a conversation afterward.

Can DAU Give Us What We Need?

DAU usually conducts a series of initial interviews with leadership at multiple levels to help determine the most suitable type of MA. While a crucial component for many of the MA solutions at our customers' disposal, interviews alone are generally not sufficient to determine if a deep dive is well suited. After a series of more intensive discussions with DAU, it might prove to be a good fit. We have learned that, if we start the MA only after interviews, we are often addressing or fixing symptoms and not the root cause. If we do not address the root cause, the symptom usually will reappear in the same or mutated condition and still require MA, or, later, intervention to correct.

Outside the aquatic world, the term "deep dive" is more of a metaphor; it is used in many disciplines and has various meanings depending on the domain using the term. For example, a technical deep dive may involve an evaluation of the underlying scientific basis of a technical pursuit, or an in-depth analysis of a program's technical maturity, or a rigorous engineering review of the current application of certain technology vital to a program's success. A business office might even use a deep dive technique for the divergent part of a brainstorming session.

As part of its Mission Assistance (MA) portfolio of products and services available to the Defense Acquisition Workforce, the Defense Acquisition University (DAU) has been conducting deep dives for more than a decade. Our customers tell us that this in-depth analysis of their organization has helped them better understand inherent challenges and exposed some of the associated root causes inhibiting the achievement of more successful acquisition outcomes.

Where Deep Dives Fit Into DAU's Overall Learning Architecture

Figure 1 presents DAU's Acquisition Learning Model (ALM). The right-side diamond shows Performance Learning, or the learning done in the workplace, and three of the competencies that support Performance Learning written on the diamond perimeter. The supporting competencies are Demonstrated Experience, Workshops, and Mission Assistance. Research has shown that almost 80 percent of all learning takes place in the workplace and that's where MA comes in—the workplace and not necessarily the classroom or online.

Typical Origins of MA Requests

Normally, MA requests come from acquisition organizations after learning more about the extent of DAU's capabilities outside the classroom, either through DAU's website, or from a

In some cases, MA without a deep dive is analogous to ready, fire, aim—in other words, an MA event without aim is almost certain to miss the desired target. In the same context, DAU would expend resources and invariably miss the target without the data from a deep dive.

There are exceptions. If an organization has a shortage of trained personnel to meet its current or emerging mission, DAU can respond with a variety of time-urgent training options. However, untrained personnel filling certain positions could suggest a bigger issue. Why are they filling positions without training? Do they have access to the required formal training, or has the organic, on-the-job training program waned or become ineffective? DAU uses a highly interactive workshop venue in which our customers use their own products, in many cases, as part of the workshop. That is the perfect approach for newly arrived personnel who need a quick course in which they can go over new policies or refresh their skills. DAU also offers various workshops that can be conducted with the staff or workforce. Some examples include Acquisition Leadership Development, Stakeholder Management, Risk Management, and Services Acquisition, as well as Continuous Learning Modules (CLMs) and/or modified standard course modules tailored to the organization (ACQ 201B, ENG 203 for Nuclear weapons) CLM on the Nuclear Phase 6.X process. Some actions, policy or discipline, for example, need to be owned by the leadership, while workshops with specific topics would be facilitated by DAU.

A deep dive that uses a survey usually requires a series of events coordinated with the organization leadership.

More About the Survey Process

Following a series of conversations with various leaders, DAU begins to better understand the customer's organizational dynamic. But sitting down with the customer and
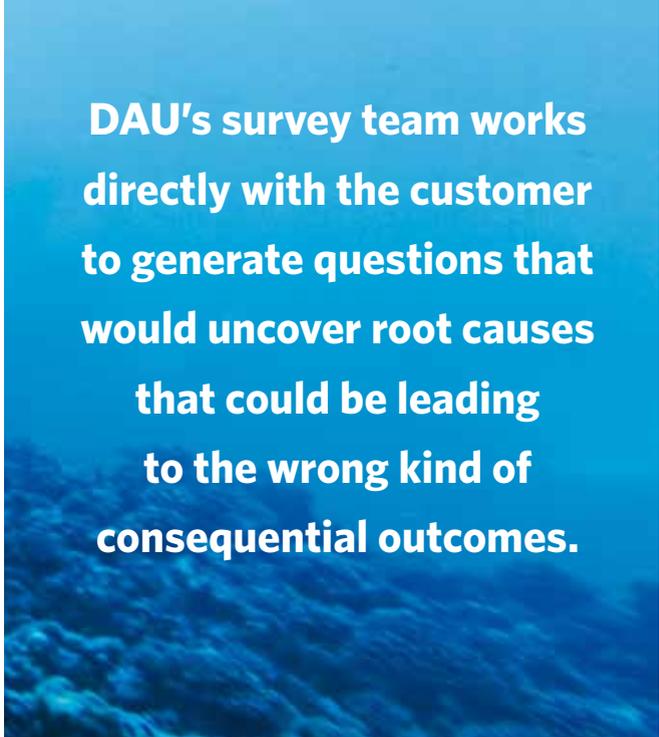
co-developing an in-depth survey with specific questions tuned to the identified challenges is a sure way to get the data. Designing a survey is not as simple as it sounds. It requires a great deal of preparation. Survey question design is not a task for one person but rather a collaborative effort between DAU and the customer. During these question design meetings, DAU's survey team works directly with the customer to generate questions that would uncover root causes that could be leading to the wrong kind of consequential outcomes. The customer is involved throughout the development period, providing feedback on the draft survey. DAU can sometimes start the process with a boilerplate survey tailored for the organization requesting MA.

Rating scale questions bundled in matrix-form coupled with open-ended questions provide a strong qualitative and quantitative measurements yielding greater credence to richer assessments. These deep dive surveys can also serve as an organization's health check-up. The results could confirm the need to provide a booster shot in many areas—including communication, trust, conflict management, professional development, internal processes, feedback, accountability, advancements and recognition, to name a few such areas.

Every DAU survey also includes demographic questions in order to determine how different populations within an organization respond. For example, a large percentage of the same population negatively responding to the same question provides is a valuable data point.

Open-ended questions are included throughout the survey to enable respondents to open up about new areas related to the topic or to get things off their chests. In the aggregate, these may result in new themes we need to address.

Survey results are compiled and analyzed. The lead faculty member and analyst build a presentation that recommends course(s) of action for the organization's leadership.

Protecting the respondents' anonymity is of the utmost importance. Every survey response is confidential and protected. All survey results are presented in aggregate, and the requesting component (organization) never sees the raw data—another way the DAU survey team protects respondent anonymity. Nothing will ever be presented or briefed if it can be attributed to any individual in any way.

Many types of formats are available for structuring surveys, depending on the desired results and preference of the developers and analysts. One format used recently focused questions on the types of intervention, corrective action or MA that were available.

Examples (from *The Performance Consultant's Field Book: Tools and Techniques for Improving Organizations and People* (2nd ed.). John Wiley and Sons, 2006. [Figure 8.2. The Families of Interventions]):

> **DAU's survey team works directly with the customer to generate questions that would uncover root causes that could be leading to the wrong kind of consequential outcomes.**

- **Information focused:** This type of corrective action might be as simple as an all-hands meeting to disseminate information or may require a change in climate that would foster better communications. Depending on other related factors, Crucial Conversations, Speed of Trust, and Stakeholder relationship workshops might also be appropriate.
- **Consequences focused:** If poor behavior in many areas is the issue, a consequence-type intervention may result. This could take the form of "New Rules" information or a facilitated workshop with management and a worker's council to develop the rules and appropriate scaling of consequences.
- **Design focused:** These activities are intended to change behavior, beliefs or way of doing business by modifying the organizational structure, revising the reporting chain, or by making other modifications to effect the desired outcome. This could be done by fiat or through a participatory facilitated workshop.
- **Capacity and capabilities focused:** This type of action might be appropriate for needed training because of new technologies, new workforce members or changing needs. With the workforce diminishing in some areas and with increasing demand for support, this type of workshop or activity can help develop an optimal solution to improve capacity or capability.
- **Action focused:** If we have a problem and the commander wants a solution, this type of intervention or activity might be appropriate. The scope could range from a simple set of directions and/or policy proliferated from the commander to a facilitated workshop with appropriate attendees to design the actions that need to take place.
- **Congruence focused:** This is indicated when we need to get folks on the "same sheet of music" so everyone is working the same problem at the same time. Over time, some organizations drift in the tight control and discipline required for certain activities. A congruence-focused action can solve the problem.
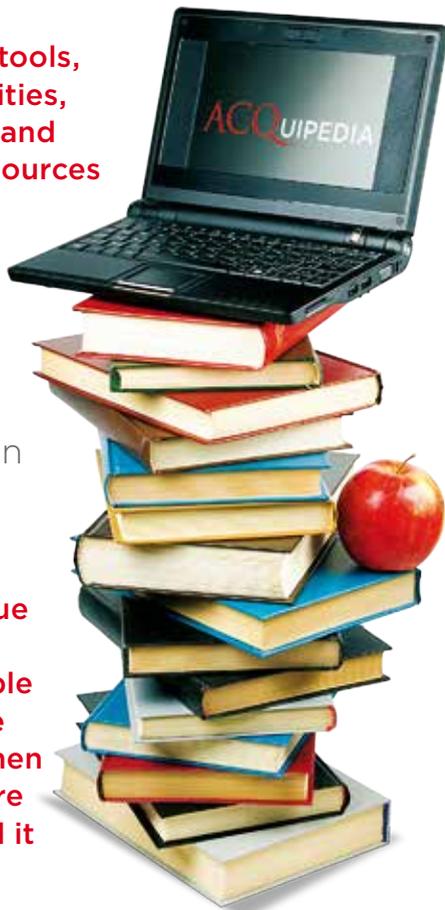
Aside from the quantitative feedback from respondents in deep dives, a sampling of their recommendations includes:

- Reorganization
- All-hands information meetings
- Leadership workshops
- Alternative work schedules
- Advancement opportunities

Following the deep dive, analysis and brief to the command staff, a single workshop or series of workshops may be presented. In most cases, the more compelling imperative is that a long-term plan be implemented to help meet the organization's specific needs, coupled with longer-term communications strategies to help keep command, management and working staff well aligned.

A significantly powerful combination involves joining Executive Coaching and the related Extraordinary Future envisioned by the coached client with various facilitated workshops to get the workforce to buy in and achieve that Extraordinary Future.

DAU continuously seeks customer feedback on the efficacy of MA. We need to know if we got it right, good or bad—and what changes might be warranted to improve our products and services.

Using the results of the survey, an organization's leadership and DAU faculty lead collaborate to determine a long-term plan for the organization. With Executive Coaching, Consulting, the Defense Acquisition Executive Overview Workshop, Soft Skills Leadership training, tailored academic modules, and tailored intervention modules such as Crucial Conversations®, Will-Cost/Should-Cost, or cybersecurity workshops, the options are seemingly limitless.

What DAU Customers Say About DAU Support

While we can't name the organizations for which we've conducted deep dives, here is what one organization stated:

> The initial consultation resulted in a survey which helped identify specific problems which need to be addressed. The second consultation (the classes) revealed an interest in solving the problems that went beyond just the managers. Since we don't want to develop any solutions until everyone has been involved, no specific metric on improvements [is] available, but as previously said word has spread, and the workforce is hopeful that viable solutions can be developed and implemented.

While a deep dive might sound a little ominous, the organizational gains it offers are well worth the initial investment. It won't fix everything, but it reinforces what's working well and what needs more attention.

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Redefining the **"Can Do"** Attitude

The Language of a Critical Thinking Culture

Christopher Phillips, Ph.D. ■ *Bobbie DeLeon, Ed.D.*

Y ou and your team face a complex problem. What is your first response? What are your thoughts and feelings about the situation or words that describe the issues?

Take the word "snow." What comes to mind? What thoughts does it prompt? Knowing the snow is of the blizzard variety rather than a mere dusting gives you better clarity and precision as you translate your thoughts into words and then deeds. You have a better understanding of what's taking place, and what action to take, whenever you have a more precise meaning.

While traipsing through northern Canada in the 1880s, noted anthropologist Franz Boas discovered that Alaska's Inuits had 50 words for snow—words like "aqilokoq" for "softly falling snow" and "piegnartoq" for snow that's "good for driving sled." There is little wonder they had an array of nuanced definitions for snow, given how it impacted virtually every aspect of their lives.

Language shapes our thinking and our culture. It shapes our lives and livelihoods, how we go about our day, how we make decisions, major and minor, in our private and professional lives. In our professional lives, if we think through

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Phillips *is a specialist in the Socratic method of group learning and a noted speaker, consultant, moderator and author.* **DeLeon** *is a professor at the Defense Acquisition University's Defense Systems Management College at Fort Belvoir, Virginia.*

a problem using a systematic process, and everyone in the group knows the precise meaning of the words used, we start with a strong foundation for moving toward better outcomes.

What's more, if we ask others to state their assumptions or to clarify their purposes, we have a common language from which to exchange perspectives, and to discover whether they're aligned with the facts, with the information at hand, and the conclusion we've drawn—or not.

Three Important Questions in a "Thinking Culture"
- What are my assumptions?
- What points of view should I consider?
- What is the purpose of my thinking?

This thinking language advances the cause of critical thinking itself and creates a thinking culture.

"Can Do" Attitude and Uncritical Thinking
How about the term "can-do"? It is generally used to characterize leaders and teams and enjoys a positive connotation. But is it always a good thing? Does that mean it always leads to positive outcomes?

Vice Admiral Terry J. Benedict, director of the Navy's Strategic Systems Programs (SPP) was determined to find out. Benedict and his staff have the major responsibility of nuclear war deterrence. Needless to say, the working environment is fraught with great tension and risk, with little margin for error. The program has been fulfilling its mission for 60 years.

But to Benedict, who took over in 2010, SSP can't rest on its laurels. The stakes are too high.

The year after he assumed the helm of the SSP, the Fukushima disaster occurred on March 11, 2011. A massive earthquake triggered a major tsunami. The Fukushima Daiichi Nuclear Power Plant structures were not capable of enduring a major tsunami, nor the powerful ground motion of an earthquake. These events disabled the power supply and hence the ability to cool three of the Fukushima nuclear reactors. Their cores melted over the next 3 days.

The Fukushima Analysis
This was a wake-up call for Benedict. He pored over the comprehensive report that described the chain of events that led to the wholesale safety breakdown at Fukushima. The report essentially blamed the failure to prepare against earthquakes and tsunamis on the Japanese culture of compliance and deference to authority and of unilateral control in the decision-making hierarchy.

What particularly impacted Benedict was the report's finding that the culture's devotion to sticking with its existing safety program, come what may, its reluctance to question authority, and the prevalent "group mentality" all contributed to the disaster. These characteristics drove how decisions were, or were not, made by a risk-ignorant culture that worshiped at the altar of a detrimental sort of "can-do" attitude.

In the acquisition workforce, both leaders and teams often seek to cultivate a version of the can-do attitude. In the case of Benedict and the SSP, it is meant to be done in a deliberate way that ideally leads to greater safety awareness.

The Lesson of Risk Ignorance
After reading the detailed accident report on Fukushima, Benedict was prompted to ask how much of the kind of mindset that existed among employees at the Fukushima Daiichi Nuclear Power Plant was engrained in his own organization and culture. He further wondered if the can-do attitude in the SSP culture also is overdone. Can it lead to the same kind of risk ignorance as it did in Fukushima?

One principle lesson that Benedict gleaned from the report along with a greater appreciation of Heinrich's Law was this: If you ignore all the little or so-called minor things in safety—mishaps, accidents, near misses and oversights—and a big event strikes like the tsunami that triggered a cascade of subsequent catastrophes at Fukushima, then you realize in retrospect that it was the little things that had been happening all along that led to the tragedy. The tsunami itself of course was unavoidable, but much of what unfolded in its wake would have been far less ruinous if there had been a sound critical thinking culture surrounding the safety program at the power plant.

Benedict understood full well the human tendency to read a report like this and conclude after the fact, "We should have seen it coming." It is always easy to see such things with perfect clarity in hindsight. But to him, it was necessary to have this kind of clarity of insight—without blind spots—while the situation unfolds in real time, rather than afterward. Ostensibly, personnel had ignored repeated minor mishaps at Fukushima Daiichi Nuclear Power Plant, because they didn't really grasp their potential significance and therefore didn't respond appropriately. The staff at the plant did not possess the risk-aware culture that Benedict envisioned.

Benedict and his team of officers sought to examine other safety calamities that had root causes similar to Fukushima—i.e., the fatal 2012 attack against American diplomats in Benghazi, Libya, as well as the USS *Greeneville* collision and the NASA space shuttle disasters. He did so to ensure that he was promoting at the SSP a risk-aware rather than a risk-ignorant culture. The culture Benedict pursued was one in which all those involved in the enterprise possessed a pervasive willingness to rethink, a sense of accountability, and purposeful courage—a very different kind of "can-do" attitude than the one at Fukushima and the other disasters his team investigated.

In Benedict's view, success is a lousy teacher—and so the 60 years of success that the SSP enjoyed actually served as even greater impetus for him to "carry it forward" and to make sure

that the culture he was developing within his organization was populated with critical thinkers. Yet he worried: Are we just one incident away from Fukushima?

His team also studied the USS *Greeneville* disaster, a high-profile case in which a U.S. Navy submarine off the Japanese coast surfaced right under a fishing vessel, killing nine of the fishing boat's crew members. When the incident was investigated, it was discovered that chaos had been the norm for that submarine's culture. What connected Fukushima with the *Greeneville* accident was that personnel in both cases were supremely risk ignorant and also, to a lesser extent, risk averse. Their culture was characterized by the pervasive behavior of rushing through safety procedures, with careless accommodation providing the norm, rather than operating within the boundaries of good practice and normal protocol—very much the wrong kind of can-do attitude.

When Benedict's team studied both the *Challenger* and *Columbia* space shuttle disasters they also found a deleterious kind of "can-do" attitude inspired by past successes. This created a kind of groupthink that discouraged individuals from stepping up and questioning flawed safety practices.

Elements of a Strategic Systems Program
- Deliberately designs a risk aware/risk evaluation culture
- Promotes a questioning attitude
- Encourages ideas and criticism
- Has transparent decision support
- Has rigor and open self-appraisal
- Practices humility and leadership by example

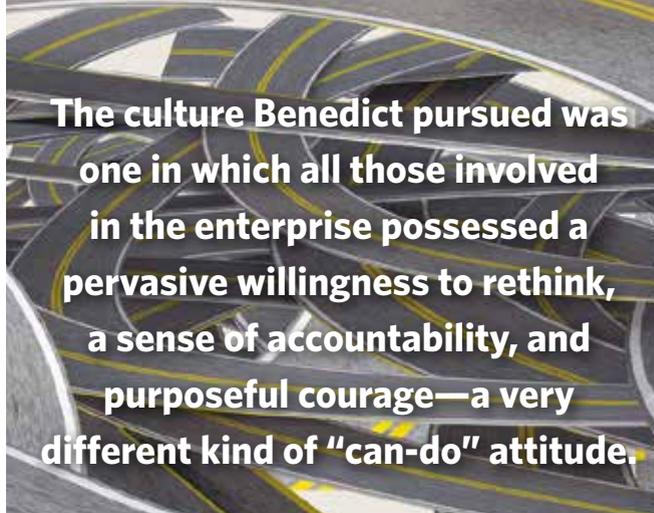### Risk Aware Thinking—a Deliberate Design
To Benedict, it was of paramount importance to deliberately design a risk-aware culture—because he was keenly aware that if you don't design a culture yourself, one will be created in the vacuum, and quite possibly be of the risk-ignorant variety.

The culture that Benedict set about creating after pondering the in-depth comparative studies by his staff was one that encouraged the continual generation of new ideas related to safety, and that valued above all else a questioning attitude—vital attributes for a thinking culture.

Attributes of a "Thinking Culture"
- Establishes critical thinking as a habit
- Clarifies thinking and rationale
- Involves thinking and collaboration with others
- Uses deliberate practice, evaluation and feedback to realize improvement

Benedict had in effect deliberately designed a thinking culture. In order to make critical thinking an ingrained habit, he established a protocol in which everyone who joins the SSP is made aware from the get-go that the goal is to strive relentlessly to be risk aware. New personnel orientation includes

> The culture Benedict pursued was one in which all those involved in the enterprise possessed a pervasive willingness to rethink, a sense of accountability, and purposeful courage—a very different kind of "can-do" attitude.

Fukushima, and the lessons to be learned that relate to the SSP's own mission.

Furthermore, new employees are issued a card that enumerates essential human traits and mitigating risk-aware behaviors, along with an explanation of why it is vital for achieving the SSP's one-of-a-kind mission. As a member of the SSP, employees also must be able to explain the reasoning behind a recommended decision. What's more, the decision-making process itself is extremely transparent. As a consequence, there is no unilateral authority, and so no single person has the power to make a decision—a bedrock component of Benedict's culture of deliberate design. Additionally, there are numerous checks and balances among the different groups in this "flat organization" that has little hierarchy. All SSP staff work together and interact as part of an integrated whole with a shared sense of mission and purpose in this high-consequence, high-tension environment.

Moreover, as part of the overarching goal of creating a risk-aware culture, everyone at the SSP has the right to ask, and is encouraged to ask, "Why are you doing this?" Staff members are given considerable autonomy intermingled with regular feedback from peers. This keeps everyone on track and on board. Those who perform exceptionally well in promoting and promulgating this risk-aware kind of can-do culture are rewarded and recognized—not just those within the government who work directly for the SSP, but their industry partners as well.

Frank Kendall, Under Secretary of Defense for Acquisition, Technology, and Logistics, has stressed that critical thinking is "necessary for success" and that it means "figuring out the best course of action in a specific circumstance, balancing all of the complex factors that apply to a given situation." He could well have been describing the culture of Benedict's program and the crucible in which thoughtful decisions are made every day so that the SSP continues successfully with its mission. SSP truly is characterized by a critical thinking, can-do culture.

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Auditing Organizational Security

Eugene A. Razzetti

Managing organizational security is no different from managing any other of the command's missions. Establish your policies, goals and risk parameters; implement, train, measure and benchmark them. And then audit, audit, audit.

Today, more than ever, Organizational Security is an essential component of a robust, responsive military command. And commands that cannot execute their operations in a self-imposed and self-monitored secure environment may, at best, cease to be effective or, at worst, cease to exist. This is the same, certain fate that befalls private enterprises that cannot maintain operational effectiveness, profitability or product superiority—except it happens faster in the private sector.

Organizations must harden their operations to protect them from either incidental or deliberate attack. Internal (or self-) auditing is essential to the hardening process.

Cybersecurity, the concept most frequently promoted these days, is a body of technologies, processes and practices designed to protect networks, computers, programs and data from attack, damage or unauthorized access. Is cybersecurity important and necessary? Of course! However, cybersecurity should not be regarded as independent or standing alone. Cybersecurity is an indispensable element of organizational security, which is the subject of this article.

Figure 1 describes the many organizational security-related challenges that military commands (including cybersecurity) confront in moving from planning to executing their missions.

Razzetti, *a retired U.S. Navy captain, is a management consultant military analyst and certification auditor. He is the author of five management books, numerous articles and analytical reports, and has served on the advisory boards of two business schools.*

Figure 1. The Big Picture: Organizational Security in Mission Execution

Planning — **Execution**

Goals, Objectives, Metrics, MOE

Organizational Security

Planning:
- Threat/Vulnerability Identification
- Mission Continuity
- AT/FP
- Hazard types (e.g., medical fire, bomb, cyber attack)
- Kidnap/Ransom
- Sabotage
- Infrastructure
- Facilities/Utilities
- Natural Disaster
- Perimeter
- Hacking/Espionage

Execution:
- Emergency Response/Recovery
- Emergency Operations Center
- Information Technology
- Environmental Rules/Regs
- Crisis Management Plan
- Risk Assessment/Risk Management
- Records/Documentation Redundancy
- Responsibility/Accountability
- Audits/Analyses
- Unit Impact Analyses
- Hazard Identification
- Standards Development
- Process Development

Feedback Channels
Gap Analyses
Continuous Improvement

AT/FP: Anti-terrorism/Force protection
MOE: Measures of Effectiveness

Several years ago, I worked as a military analyst on programs that included information warfare (like all modern defense programs). The lesson I continually relearned during that time was that information is the only "weapon" that can be in more than one place at the same time.

As information technology (IT) is increasingly integrated with physical infrastructure, the risk increases of wide-scale or high-consequence events that could harm or disrupt military commands and their missions. Therefore, strengthening organizational security and resilience is critical.

All U.S. military commands depend on IT systems and computer networks for essential operations and mission fulfillment. IT systems face large and diverse cyber threats that range from unsophisticated hackers to technically competent intruders using state-of-the-art intrusion techniques. Many malicious attacks are designed to steal information and disrupt, deny access to, degrade or destroy critical information systems or to put infrastructure (e.g., power plants) out of commission.

Internal and external auditing of organizational security programs can ensure compliance with requirements and can sustain an acceptable level of impregnability. However, generating preventive and corrective actions as a result of those audits and reassessing goals and objectives based on audit findings perpetuate continual improvement and help to establish and maintain an ongoing robust security posture. This involves eternally raising the bar and leaving the current status quo in the rearview mirror. I recommend that commanders who want to establish and maintain structured information systems security management review the following from the International Organization for Standardization (ISO): ISO 27000: *Information Systems Security Management.*

A robust program of internal auditing of a command's organizational security hardens and protects military operations under a structured organizational security management system. Anything less than robust jeopardizes the existence of the command, the capability of its leadership and the fulfillment of its missions.

There are 10 auditable areas in which commands can create and sustain credible, effective and secure management systems and strategies—for headquarters commands, subordinates in the field and suppliers.

1. Policy Development
Commanders must develop, as applicable to the mission, written security policies that are:

- Consistent with the other policies of the organization and those of higher authority
- Specifically keyed to planned security objectives, targets, and programs
- Consistent with the organization's overall security threat and risk management strategy and the nature and scale of its operations
- Clear in stating overall/broad security management objectives
- Documented, implemented and monitored
- Communicated to all levels and to third parties, including contractors and visitors, so that they all are made aware of their security-related obligations.

> ## Things refuse to be mismanaged long.
>
> ### —Ralph Waldo Emerson

2. Program Management

Effectively managing any program requires the continual monitoring of the effectiveness of projects, procurements and suppliers, establishment of metrics and early identification of potential problems. Commands must assess all their functions and spend their limited resources according to how much their vulnerability is reduced by that expenditure, as shown in Figure 2.

As the arrows suggest, managers want to minimize funds committed to ineffective programs. The goal of the program management (with programs pictured as small pyramids) is to move programs into Quadrants II and III. Programs in Quadrant I may appear acceptable but can breed complacency, and there is no longer any room for complacency in organizational security. Programs or projects that fall into Quadrant IV are unacceptable and require forthright (and probably unwelcome) corrective action.

At the same time, commanders must establish program management roles, responsibilities and authorities that are consistent with achieving security management policies and objectives. And these must be communicated to all responsible parties.

Commanders need to make a commitment, measurably and consistently, to developing a Security Management System (SMS) and continually improving its effectiveness. This is accomplished specifically by:

- Communicating to all parts of the organization the importance of meeting security management requirements in order to comply with established policies
- Ensuring any security programs generated from other parts of the organization complement the security management system
- Establishing meaningful security metrics and measures of effectiveness
- Ensuring security-related threats, criticalities and vulnerabilities are evaluated and included in organizational risk assessments where appropriate
- Ensuring the viability of the security management objectives, targets and programs.

3. Security Risk Management

Security risk management, like any other focused risk management strategy, requires that commanders identify and assess "risk" in terms of threats, criticalities and vulnerabilities to the commands and their assigned missions. Commanders must establish and maintain strategies for the ongoing identification, assessment and mitigation of all risks, especially those related to organizational security. Mitigation means identifying and implementing effective control measures. In the execution of control measures, risk assessment becomes risk management. An effective security risk assessment strategy should include identifying (when appropriate):

- Physical failure threats and risks, such as functional failure, incidental damage, malicious damage or terrorist or criminal action
- Operational threats and risks, including the control of security, human factors and other activities that affect the organization's performance, condition or safety
- Factors outside of the organization's control such as failures in externally supplied (e.g., outsourced) equipment and services
- Security equipment, including replacement, maintenance, information and data management and communications
- Any other threats to the continuity of operations

Please see my article: "Robust, Replicable and Defensible Risk Management—At Headquarters or the Front" in the July-August 2016 issue of *Defense AT&L* magazine.

4. Security Training and Qualification

Security-minded organizations appoint (and entrust) personnel to operate their security management systems. Like any other responsible positions in the military, the people who design, operate and manage the security equipment and processes must be suitably qualified in education, training,

Figure 2. A Cost vs. Effectiveness Matrix (Example)

Figure 2. A Cost vs. Effectiveness Matrix (Example)
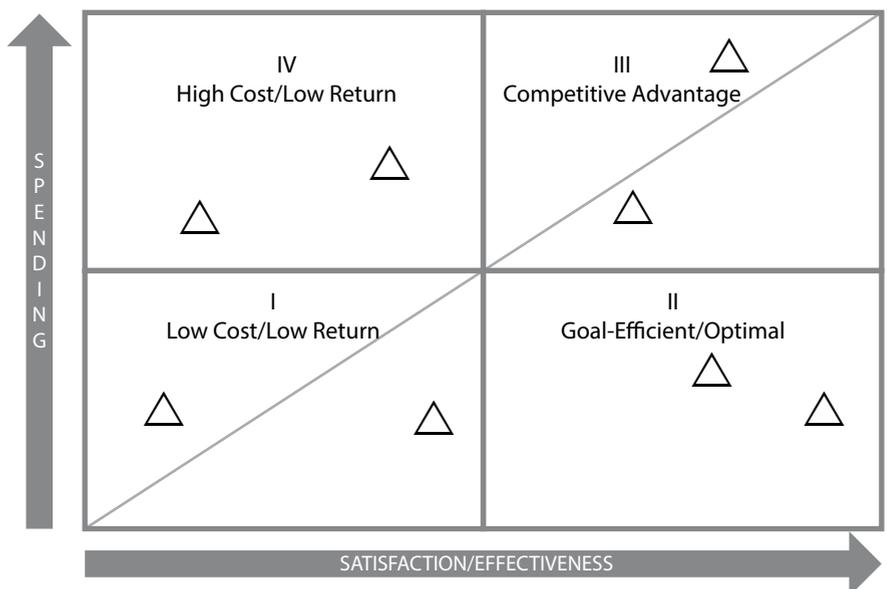
certification and/or experience. I put the word "qualified" in italics because training may not be enough. Commanders need qualification programs—not just a training plan—for all critical positions and watch stations.

Furthermore, all personnel must be fully aware and supportive of the importance of compliance with security management

curity management policy, objectives, targets or programs, processes or procedures, and the introduction of new security infrastructure, equipment, or technology also should be documented.

Auditing the supply chain also means auditing compliance with legal, statutory and other regulatory security requirements,

The security-minded organization needs to establish, implement and maintain appropriate plans and procedures (including creating back-up records or files) for responses to security breaches and emergencies and to prevent and/or mitigate likely consequences.
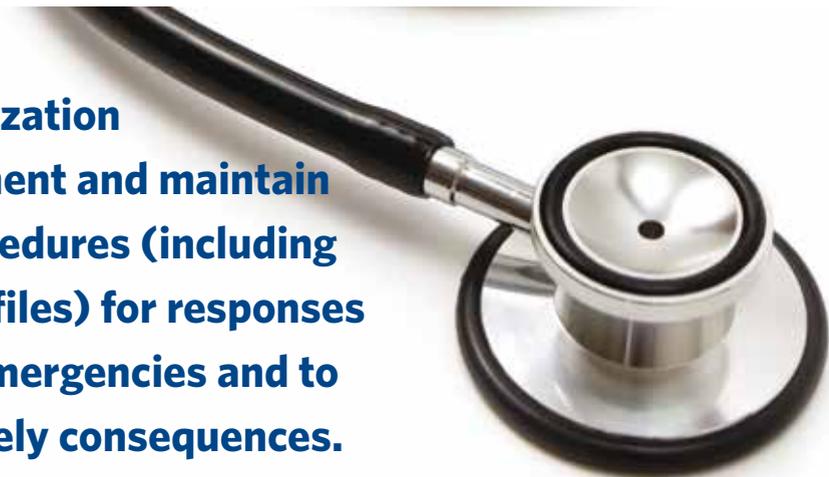
policies and procedures and of the requirements of the Security Management System, as well as their own roles in achieving compliance. This includes emergency preparedness and response, and awareness of the potential security implications of deviating from specified procedures.

5. Supply Chain Security
Every military organization has a supply chain. Security requirements and attendant risks, whether upstream or downstream of its activities, can profoundly affect operations, products or services. Identifying, evaluating and mitigating threats posed from upstream or downstream supply chain activities is just as important as it is for performing the same functions inside your own "fence line."

Commanders would do well to audit outside that fence line. They can do so by:

• Identifying all links/nodes of the supply chain and ensuring they conform to stated security management policies, controls, and mitigation of unacceptable risks
• Examining documented procedures for situations in which a lack of procedures could lead to failure to maintain operations
• Establishing the security requirements for contractor-furnished goods or services that impact mission accomplishment
• Providing hardened and redundant lines of communication

Where existing designs, installations or operations are changed, documentation should address attendant revisions to command structure, roles or responsibilities. Se-

security management objectives, delivery of security management programs, and whether the program provides the required level of security (convoys, containers, warehouses, etc.). In my experience, there can be no control of the supply chain without a viable and robust auditing function.

6. Communication and Documentation
Commands must have secure, hardened and redundant procedures for disseminating all pertinent security management information. This applies to outsourced or host nation-provided operations as well as those taking place within the organization. This is especially important when dealing with sensitive or classified information.

A security management system documentation system includes but is not limited to:

• The security management system scope, policy, objectives and targets
• Description of the main components of the security management system and their interaction, with reference to related documents
• Documents such as records the organization determines to be a necessary part of ensuring the effective planning, operation and control of processes related to its significant security risks.

7. Emergency Preparedness and Response
Emergency response may be thought of as conducting normal operations at faster-than-normal speeds—or something entirely different. The security-minded organization needs to establish, implement and maintain appropriate plans and

procedures (including creating back-up records or files) for responses to security breaches and emergencies and to prevent and/or mitigate likely consequences.

Auditing emergency plans and procedures should include all reviewing (and any testing) information that may be required for identified facilities or services during or after incidents or emergencies in order to maintain continuity. The best emergency planning I ever saw was at U.S. Navy Bases along the Gulf Coast, which face an immense and perennial threat from hurricanes. Commanders and staff members periodically should "stress-test" the effectiveness of their emergency preparedness, response and recovery plans and procedures, especially after incidents or emergencies caused by security breaches and threats. They should test these procedures periodically.

A supporting program of internal or outside security audits also confirms whether the organization is complying with relevant legislation and regulations, best practices and the policies and objectives established by higher authorities. Commands need to maintain records of results, findings and required preventive and corrective actions.

Security-minded commanders and staffs can audit their security management plans, procedures and capabilities. Security audits can include periodic reviews, testing, post-incident reports and lessons learned, performance evaluations and exercises. Significant findings and observations, once properly evaluated or gamed, should be reflected in revisions or modifications of policies and procedures.

8. Daily "Quick Looks"
Here are some immediate feedback operational initiatives for forward-thinking and security-minded organizations trying to identify and mitigate (on a daily basis) their vulnerability to exploitation. Develop some checklists, and "check out" the following:

• Intrusion detection systems
• Fences, security lighting, natural barriers
• Closed-circuit TV
• Computer backup systems; "firewalls" against viruses and intrusions
• Roof and ventilation duct accessibility
• Construction materials and thickness requirements
• Installed firefighting systems
• Roads, alleys and storm drains
• Parking areas
• Sewage treatment systems
• Locks, doors and access control
• Identification management (i.e., employees, customers and vendors)
• Utilities (including uninterruptible power systems and emergency generators)
• Safes, desks, filing cabinets, controlled/exclusion areas
• Hazardous materials generation, storage, and management

• Vehicle surveillance and security (including delivery and fuel trucks)
• Proximity of emergency services (i.e., fire departments, medical emergency services, and police)
• Mail and package processing

9. Preventive and Corrective Action
Audit➜Nonconformity➜P/C Action➜Corrected/Improved

Auditors (by any name) discover "nonconformities." They identify the need for either preventive or corrective action. Top management (we hope) supports the audit findings and initiates preventive or corrective actions and seeks feedback and follow-up to measure the success (or lack thereof) of these actions.

Audits of organizational security are no different than audits of any other management program. In fact, the need for prompt corrective action may be even more critical.

10. Continual Improvement
Continual improvement is the basis and underpinning of the ISO. All processes must be considered ongoing and never at an "end state." Top management develops a continuous improvement mindset that something can always be improved. Continual improvement of organizational security requires that commanders and staffs review their security management systems at planned and frequent intervals. This is necessary in order to ensure continuing effectiveness in an ever-changing environment. Security audits and reviews should include assessing opportunities for improvement and the attendant need to revise the security management system, including security policies and security objectives, plus threats and risks. Organizations already working with ISO 9000 and ISO 14000 can, with minimal effort, expand internal audits and management reviews to cover security and well as quality and environmental management. See the American Society for Quality website at www.asq.org.

Summary
Information can be exploited in many ways, and auditing organizational security has tremendous potential for experienced commanders and staffs to harden their resources and missions. The opportunities for continual improvement from auditing are as vast as cyberspace and as identifiable as office furniture.

Organizational security must be part of every mission. Outputs from security audits should be the catalyst for any revisions to the security management system, together with cost-benefit analyses, schedules, risk revisions, and other justifications. Establish policies and procedures, identify threats, conduct risk assessments, implement processes, identify corrective actions, and establish a mindset of continual improvement. And audit.

The author can be contacted at **generazz@aol.com**.

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O Exceptional   O Great   O Good   O Fair   O Poor

Please rate the design of the publication.

O Exceptional   O Great   O Good   O Fair   O Poor

Please select yes or no to the following statements:

	Yes	No
This publication is easy to read.	O	O
This publication is useful to my career.	O	O
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I read most of this publication.	O	O
I recommend this publication to others in the acquisition field.	O	O

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S U R V E Y

OSD Logistics Fellowship—A View From Above

Bryan L. Jerkatis

A friend and retired U.S. Air Force Command Chief would often use an analogy with young troops regarding the differences in their world views versus those of their leadership. "Your view of the ground (truth) depends upon the height of the branch in the tree upon which you are standing … ," he would explain.

Nearly 3 million men and women make up the Department of Defense (DoD). How few truly have an opportunity to gain insight and understanding of the origins of legislation, budget, policy and oversight? The Office of the Secretary of Defense's (OSD) Logistics Fellowship provides selected logisticians the opportunity to broaden their perspectives and consider other points of view.

The OSD Logistics Fellows Program is open to field grade officer (04–05) and DoD civilian equivalent (GS 13–14) logisticians. This 1-year, unit-funded "fellowship" is a developmental assignment, with a goal of providing an atmosphere that fosters learning, growth, and experiential opportunities. The program is administered by the Office of the Assistant Secretary of Defense for Logistics and Materiel Readiness (ASD[L&MR]). Fellows have the unique opportunity to participate in policy formulation and DoD-wide oversight responsibilities.

Fellows are fortunate to travel and tour both the public and private sectors in order to observe, contrast and learn firsthand how logistics operations compare in private industry and then benchmark best practices. Fellows, through visits to Congress, gain exposure and insight into the legislative processes. They're also able to attend national forums and engage in collaborative efforts with industry partners. Depending on their assignments, fellows may have the opportunity to visit and become familiar with other government agencies, as well. Perhaps even more important, the fellowship affords participants opportunities to observe and interact with both appointed and career senior executives, and flag officers—including, "one-on-one" meetings with senior logistics leaders in the military departments, Joint Staff, OSD and agencies.

The insights and "big picture" knowledge to be gained are virtually endless, and the fellows determine much of their own training and class agendas. During my fellowship, I was tasked to resolve a longstanding logistics policy challenge within the DoD and was given considerable leeway to gain needed expertise and formulate a recommendation. That led to publication of a new DoD Directive. Other fellows led financial accountability program initiatives, participated in DoD-level awards processes, led worldwide maintenance symposiums, participated in source-selection committees and a number of other DoD-level initiatives.

Finally, there's a fellowship component of the OSD Logistics Fellowship Program. Fellows share a common bond, form a support structure and face many diverse challenges together. The OSD Logistics Fellows Program provides an opportunity to forge lifelong bonds and friendships with other logistics professionals and build networking capabilities that will serve them for the remainder of their careers and beyond. Upon completion, fellows return to their sponsoring organizations or follow-on assignments with increased management skills, technical expertise and networks that span DoD logistics.

The OSD Logistics Fellowship Program provides DoD logisticians not only a rich experiential odyssey but, perhaps more important, the opportunity to obtain a deeper career understanding of the OSD perspective and how it affects the DoD enterprise.

NOTE: The selection process for the 2017–2018 OSD Logistics Fellowship Program begins in January, per the Office of the ASD(L&MR). More information can be found at http://www.acq.osd.mil/log/LMR/fellows_program.html.

Jerkatis *was a member of the OSD Logistics Fellows Class of 2015–2016. The author can be contacted at* **bryan.jerkatis@us.af.mil**.

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Defense AT&L

Writers' Guidelines in Brief

Purpose

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

Style

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

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Articles should be 1,500–2,500 words.

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