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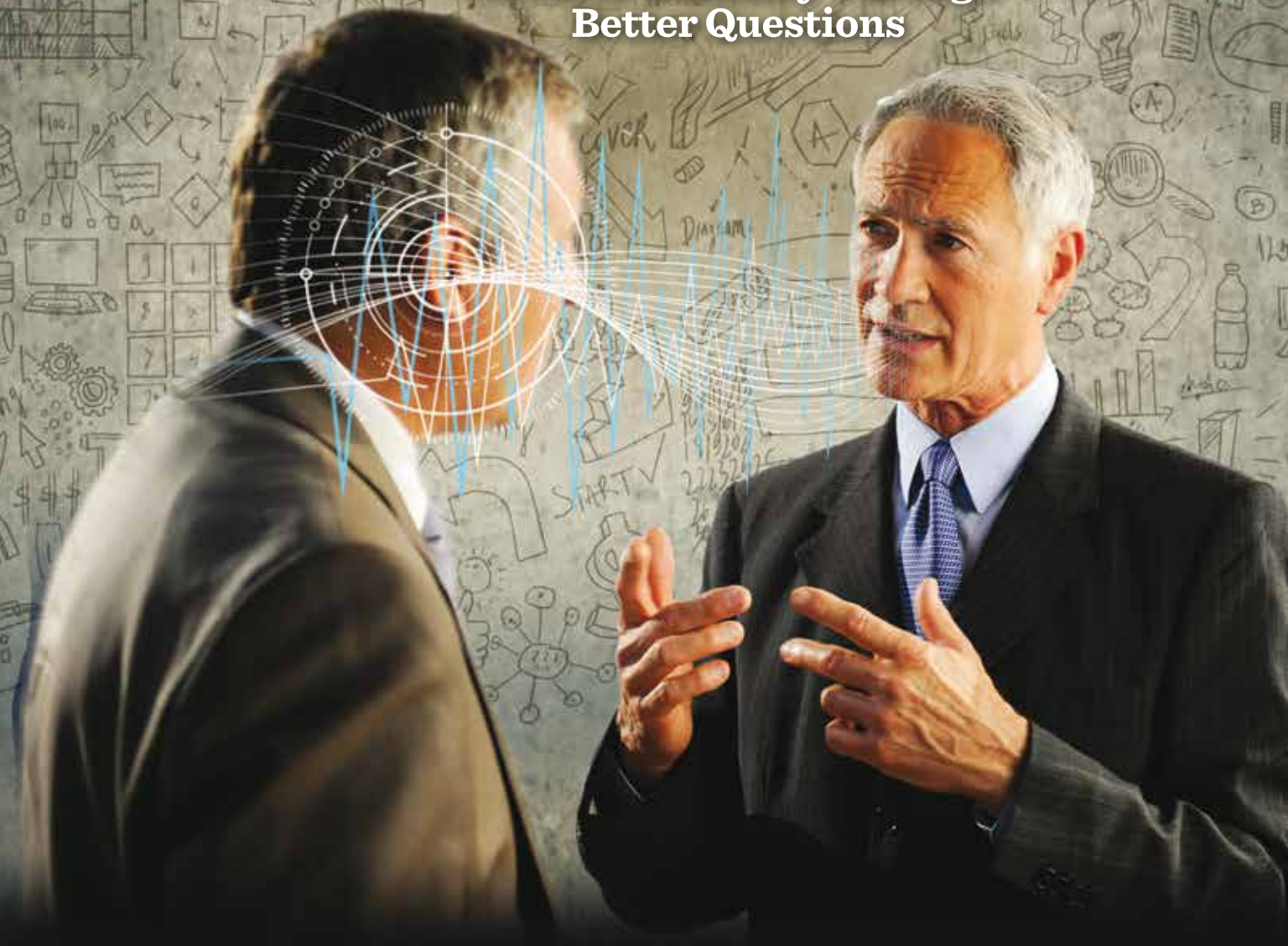
ACQUISITION

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November-December 2018

The Customer's Voice

Greater Intimacy Through
Better Questions



**Outperforming
With Doctrine,
Not Science**

**Big Data Meets
High-Performance
Computing**

**DAU's Innovation
in the Classroom
On the Go With LEGO!**

TABLE OF CONTENTS



2

The Customer's Voice

Greater Intimacy Through Better Questions

Mark S. Phillips, Ph.D., and James N. Phillips, Jr., D.B.A.

We must recognize our limitations and greater informational input from our customers to ensure what we deliver addresses our customers' needs and problems.

8

Outperforming With Doctrine, Not Science

Larrie D. Ferreira

In the face of declining government dominance in research, new defense acquisitions must be based on the technologies and developments emerging in the commercial sector—as was done in World War II.

12

Big Data Meets High-Performance Computing

J. Michael Barton, Ph.D. ■ John R. Wallace ■ Raju Namburu, Ph.D.

As business uses a wealth of data collected from myriad market activities, so the Army Research Laboratory analyzes e-mail, social network and other patterns to identify potential threats.

18

DAU's Innovation in the Classroom On the Go With LEGO!

Tyrone Theriot

Software and designer products created by the LEGO Group are used to create hands-on practical engineering exercises for a defense acquisition training program.

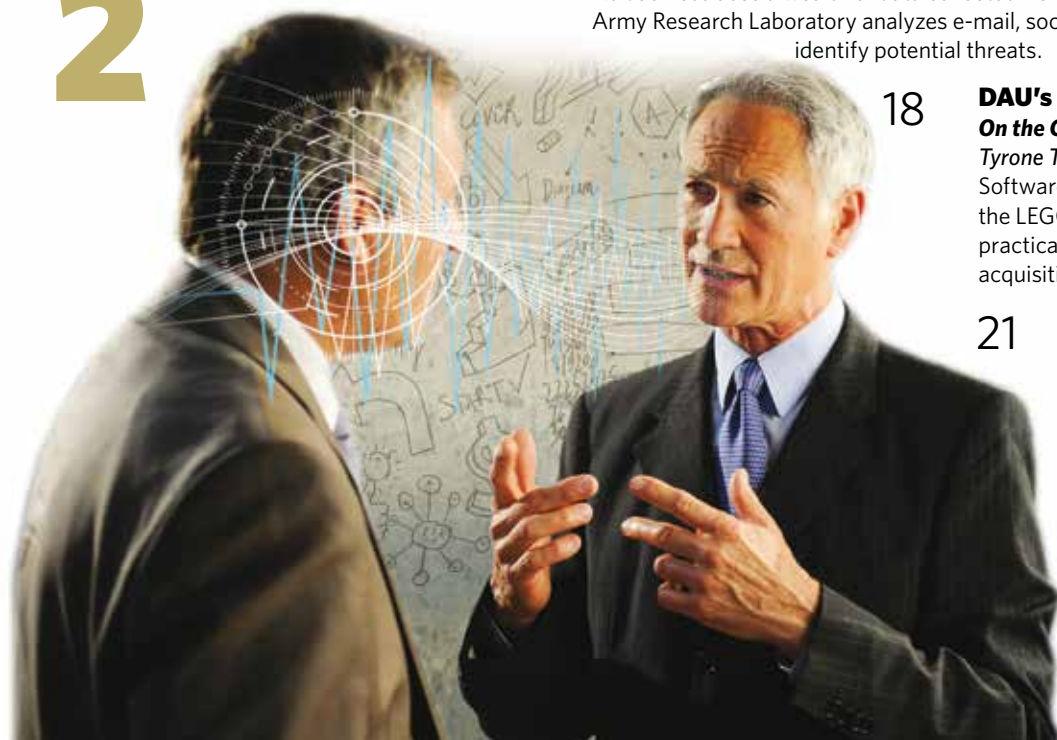
21

DEFENSE HEALTH AGENCY Setting the Standard for Cyber Safeguards

Smita Sharma

The cyber security innovations in DHA may provide a blueprint for such approaches by other sectors within DoD.

2





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Some photos appearing in this publication may be digitally enhanced.

26 **A Reminder of Why We Do What We Do**

Bill Kobren

In the first centennial of the end of World War I, pause to reflect on the great sacrifices made in that war and in other conflicts before and since.

30 **Improving the JCIDS Process**

Lt Col Andrew Zinn, USAF

Reforms are in the works to improve the effectiveness and speed of capability requirements validation. Some additional fixes can be considered.

34 **Learning to Lead**

Owen Gadeken

Leaders are made and not born, and emerge along a path of challenges met and mastered. Following directions well is one skill, and a good one, as well as an ability to delegate to and empower others.

39 **Auditing Contractor Goals and Objectives**

Nine Ways Forward for Program Managers

Eugene A. Razzetti

Program managers need to consider an outsider's look at providers of defense goods and services and consider auditing contractors to an established standard.

45 **Interruptions From Technology**

A Constant Battle to Prioritize

Diane R. Bublak

Maintaining discipline and managing our reaction to would-be interruptions can prove a key element of success.

ALSO

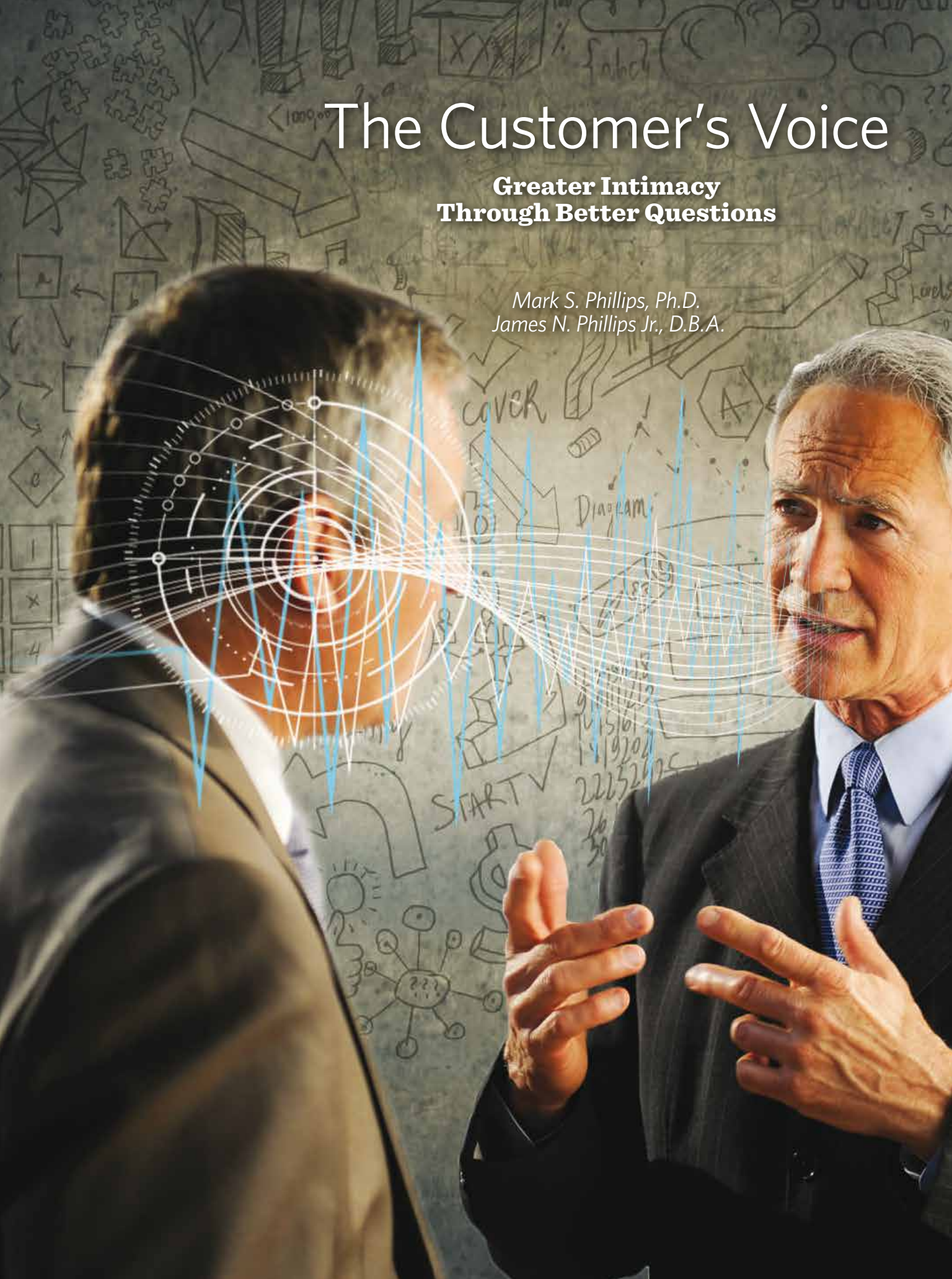
17 **Statement of Ownership**

44 **MDAP/MAIS Program Manager Changes**

The Customer's Voice

**Greater Intimacy
Through Better Questions**

*Mark S. Phillips, Ph.D.
James N. Phillips Jr., D.B.A.*





HAVE YOU BEEN IN THE POSITION OF NOT KNOWING what a loved one wanted on their birthday? After struggling with not knowing, you end up presenting a scented candle or a new dishwasher with both of you recognizing that very little effort went into the selection decision. So once again you end up in the dog house and perhaps you learned a major lesson.

The lesson is that you probably should ask a question or two instead of assuming what your loved one wanted on such an important occasion. The same holds true for customer intimacy.

What Is Customer Intimacy?

On May 16, James Woolsey, president of the Defense Acquisition University, said:

Fortunately, we have already started down the path of understanding more about what the acquisition workforce actually needs through our customer intimacy initiative and voice-of-the-customer conversations. We need to communicate and help create the culture change.

Customer intimacy is a strategy for building deep and lasting relationships with our customers, by tailoring your offerings to meet their specific needs. So how do we tailor your offerings to meet their specific needs? One way is by asking better questions.

Building Better Questions

To ask better questions, you must build better questions. When building better questions it is important to build a framework—i.e., how do we know that we are asking the right questions? Maybe in the past we asked a good question but received the wrong information. The key to knowing the right question to ask is in your tool box (Table 1).

The tool box arose from a practical “need” in engaging with a new customer. Skills were needed for getting “good” information “fast” and keeping the customer happy. In starting a new job and encountering new customers we did not always know what the customer needed, so how could we know if we met their expectations? The answer is to start with the tool box.

Building Your Tool Box

The tools are methods of gathering knowledge about a customer in order to increase our understanding and thereby become more

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Table 1. Your Tool Box

Individual ←————→ Organizational							
Tool	Individual	Voice of the Customer		Continuous Improvement	Decision Cycle	Job Design	Organizational
Theory	Dunning-Kruger	Kano	QFD	PDCA	OODA	Job Characteristics Model	Organizational Climate
Question	Questioning myself	Questioning my customers' desires	Questions to develop the voice of the customer	Questions asked but not listened to	Questions to get inside the decision cycle	Jobs that allow you to ask questions (RCA)	Organizations that empowered you to ask questions

Source: Mark Phillips

Key: Dunning-Kruger = limited self-awareness; Kano = product development theory; OODA = Observe-Orient-Decide-Act loop; PDCA = Plan-Do-Check-Act cycle; QFD = Quality Function Deployment; RCA = Root Cause Analysis

intimate in working with them and meeting their needs. The tools will be presented in a logical order from narrow focused to a more broadly used tool; however, as we become proficient in tool use, we can decide to use some or all, as seems appropriate.

Each tool presented below includes a description and a brief scenario describing its possible use and the benefit derived from using it.

Tool 1. Self-Reflection and the Dunning-Kruger Effect

The first tool allows us to question ourselves, or gain some self-reflection as a means of identifying biases and prejudices before and during decision making. We often find that we are questioning ourselves about our decisions. This is not only healthy but indicates that we are competent in our decision-making process.

In 1999, Cornell University's David Dunning and Justin Kruger wanted to know why low-ability folks are mistakenly assessing their ability as much higher than it really is. What they discovered became the basis of the Dunning-Kruger effect. Their paper, "Unskilled and Unaware of It: How Difficulties in Recognizing One's Own Incompetence Lead to Inflated Self-Assessments," published in the peer-reviewed *Journal of Personality and Social Psychology*, uncovered the idea that the more competent a person is, the likelier he or she is to question that competence. Conversely, the less competent person is more likely to believe he is competent. In other words, the more we question ourselves or entertain reflective questioning, the more likely it is that we will be able to understand the voice of the customer.

The value proposition of Tool 1 is that self-reflection aids in the identification of personal biases that otherwise might impact customer intimacy and distort the voice of the customer.

Tool 2. Voice of the Customer Tool—the Kano Model

The Beaumont Boy Scout Camp of the Greater Cleveland, Ohio, area, was losing attendance. The first question was: Why don't people come to the camp? To help develop that question, the Kano Model was used. The Kano model of product development theory and customer satisfaction was developed in the 1980s by Japanese educator and consultant Noriaki Kano. Ph.D. The model classifies customer preferences into five categories:

Requirements Type

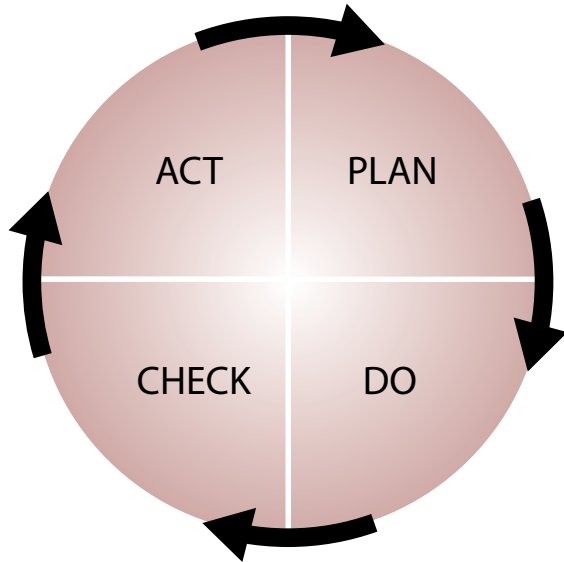
- Must Be (Expected Quality)
- One-Dimensional (Desired Quality)
- Delighters (Excited Quality)
- Indifferent (Neither Expected or Unexpected)
- Reverse (Opposite of the Expectation)

So in our given problem, better attendance would meet or exceed customer expectations, because the problem was that of declining attendance at the Boy Scout summer camp. This was in turn due to an undefined customer dissatisfaction. Current and potential customers of the camp were surveyed, using a series of questions to determine reasons. The basic customer expectation is a fun experience. The problem is outlined below:

One-Dimensional (Desired Quality)

- The customer would like a variety of things to do:
 - Shooting sports
 - Extended Camp season
 - Good waterfront activities
 - Evening programs
 - Nature experience
 - Badges awarded
 - Advancement opportunities
 - Crafts

Figure 1. Deming's PDCA cycle



Source: Mark Phillips

The customer expects a nice place to stay with running water in cabins, dry camp sites, pools and showers, more tents, good camp maintenance, and fewer insects. The customer expects a hassle-free camping experience with timely program information, an enthusiastic staff, accessible dining hall, and a stronger program.

The value proposition of Tool 2 is that understanding customer interests directly contributes to customer intimacy and refines the voice of the customer.

Tool 3. Voice of the Customer Tool—Quality Function Deployment

Question: Who is my customer? Asking better questions gives us better inputs. One tool that can help manage inputs is the Quality Function Deployment—(QFD).

Japanese planning specialist Yoji Akao, Ph.D., originated the concept of QFD in 1972, and applied it to the design of an oil tanker at the Kobe Shipyards of Mitsubishi Heavy Industry. It is a quality methodology that transforms customer requirements for design of a product, service or process into the design of components for that product. QFD also ensures that the voice of the customer can be traced into the process design. From the Kano model we began with the Voice of the Customer Demanded Items:

Demanded Items: The customer would like a variety of things to do, and expects a nice place to stay and a hassle-free camping experience. The demanded items or (needs) are translated into counterpart characteristics or how the needs may be met in the following areas: program, facilities

and customer service. This is where we review the customer's desires and determine "how" to satisfy them.

How—Counterpart Characteristic: The program requires new equipment, an accurate schedule as well as adequate and safe facilities, encounters with staff leadership, along with better trained staff and clean, dry facilities. Maintenance and resources must be improved, bugs eliminated as a problem, and adequate customer service. Also needed are knowledgeable staff, adequate supply of resources, clear and descriptive reservation instructions, informative and timely program information, professional rangers and enjoyable encounters and events as well as challenging camping experiences. Personnel must be interactive.

These items are places in the matrix and a score is assigned based on the QFD methodology. The QFD analysis revealed that timely release of program information was the top driver for parents to plan to send their children to camp. It also was found that the camp was losing attendance because Scouts were leaving the program at adulthood. The true customer was not the Boy Scouts but the Cub Scouts.

The value proposition of Tool 3 is to take a deeper dive into understanding the customer's needs, thereby becoming more intimate with the customers and speaking in their voices by defining and identifying the real customer.

Tool 4. Continuous Improvement Tool—Plan-Do-Check-Act

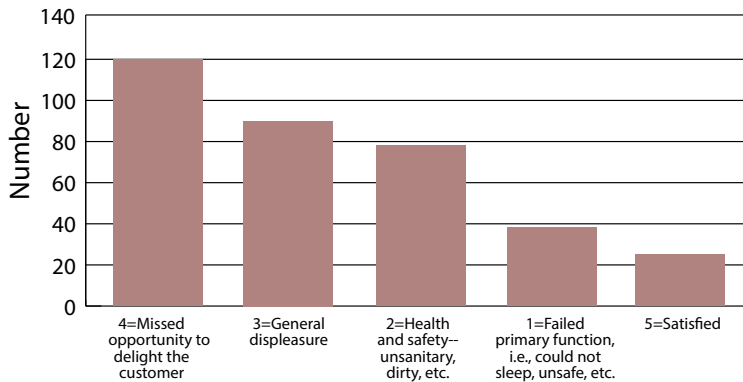
To improve customer satisfaction in hospitality management, we need to answer two questions: What is the primary mission of a hotel? Why aren't the guests happy?

The Plan-Do-Check-Act (PDCA) cycle popularized by management guru W. Edwards Deming illustrated that business processes should be analyzed and measured to identify sources of variations that cause products to deviate from customer requirements. Deming recommended that business processes be placed in a continuous feedback loop so that managers can identify and change the parts of the process that need improvements. So how does PDCA work?

Plan: Design or revise business process components to improve results. A hospitality company may discover its problems by soliciting customer responses in a survey. A survey was developed and placed on their customer Web portal.

Do: Implement the plan and measure its performance. In this case, the survey was faulty. The survey asked Likert scale questions (select from a series of given responses) that were not important to the customer.

Figure 2. Unhappy Customers



Source: Mark Phillips survey data

Check: Assess the measurements and report the results to decision makers. What did they really say? The survey included open-ended questions and those responses yielded useful information. Figure 2 illustrates that not only were the customer not delighted, they were unhappy—the company had failed in this primary mission of providing a safe, clean place to sleep.

Act: Decide on changes needed to improve the process. The organization developed a process for meeting the customers' needs and expectations. The survey was revised to capture the true desires of the customer and the process was repeated and continuously improved.

The value proposition of Tool 4 is that it is meant to provide a process-oriented tool when considering iterative changes so as to better understand the customer and to hear their voice.

Tool 5. Decision Cycle Tool—Observe, Orient, Decide, Act Loop

In building a better wind turbine, how do we get certified? How do we gain the confidence of an auditor?

Quality auditing is based on the analysis of objective evidence against a published standard. However, auditors are people and people like to be confident that the system they audit has a low risk of failure. One confidence building approach is to anticipate the auditors' questions. One tool for doing so is the OODA Loop (Figure 3).

For example, in grade school, did you ever have a teacher ask a question of the class to which you had already formulated an answer earlier than everyone else but still chose not to respond? You may have sat

and watched your classmates struggle to find an answer and felt satisfied that you already knew the answer. As you waited, 30 seconds later, a classmate's hand shot up because he had just come up with an answer. Your decision cycle was 30 seconds faster than that classmates. That is what it is like to operate inside someone else's decision cycle.

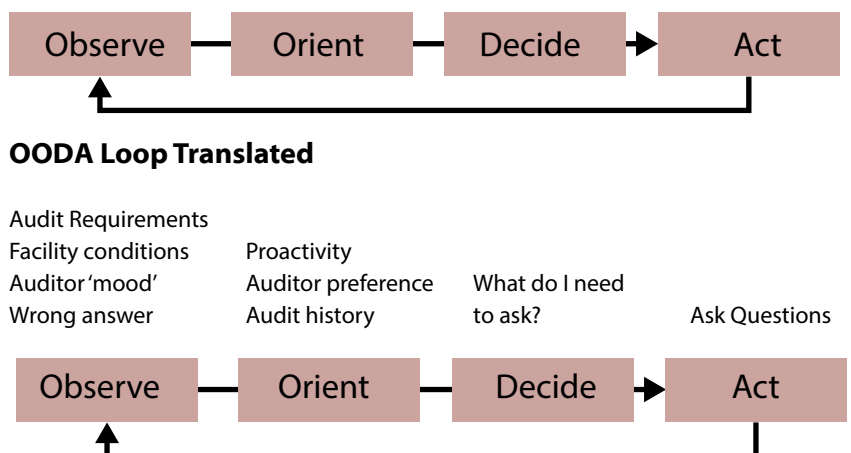
Military strategist John Boyd said, "When you are working inside someone else's decision cycle it is like they are moving in slow motion." So how do you get inside an auditor's decision cycle? Better inputs are needed! In this instance, to get inside an auditor's cycle, start with the Type Certification Audit and then build an Audit Map. This allows you to anticipate the voice of the customer and develop your response before the question is asked. You are effectively inside their decision cycle.

The value proposition for Tool 5 is becoming alert and responsive, i.e., to anticipate change, which is necessary for customer intimacy and acquiring their voice.

Tool 6. Job Design Tool—Job Characteristic Model

In 1975, Greg R. Oldham of the University of Illinois and J. Richard Hackman of Harvard constructed the original version of the Job Characteristics Theory (JCT). See their 1980 book, *Work Redesign*, published by Addison-Wesley. Jobs previously were simplified in order to maximize production; however, it was found that, when subjected to highly routinized and repetitive tasks, the benefits of simplification sometimes disappeared due to worker dissatisfaction. Due to these negative aspects of work, it was suggested that jobs should be enriched in ways

Figure 3. Boyd's OODA "Loop" Sketch



Source: Mark Phillips

that boost motivation, instead of mere simplification to a string of repetitive tasks. It was from this viewpoint that JCT emerged, as well as the Hackman and Oldham job characteristics model.

This model is the basis of the Job Diagnostic Survey. The core job dimensions are depicted by the following characteristics:

- *Skill variety*—the degree to which a job requires the worker to perform activities that challenge his skills and abilities.
- *Task identity*—the degree to which the job requires completion of a “whole” and identifiable piece of work; doing a job from beginning to end with a visible outcome.
- *Task significance*—the degree to which the job has a substantial and perceivable impact on the lives of other people, whether in the immediate organization or the world at large.
- *Autonomy*—the degree to which the job gives the worker freedom, independence, and discretion in scheduling work and determining how he will carry it out.
- *Feedback*—the degree to which a worker, in carrying out the work activities required by the job, gets information about the effectiveness of his efforts.

Collectively, these characteristics provide a way to diagnose the potential performance outcomes of a job. (See the article by J.R. Hackman, et al., “A New Strategy for Job Enrichment,” in the July 1975 *California Management Review*.) These characteristics also form the basis for job redesign.

For example, Morris was a journeyman meat cutter before his position was eliminated. As a butcher, he was in charge of the meat department at a large grocery store and operated it autonomously. After he was laid off, Morris could not find a job in his field, so he was hired as an inspector at a small arms factory. As a receiving inspection technician, his job was very narrow in scope. He was not allowed to investigate or ask questions regarding customer complaints with the supply chain. He had no ability to respond to the voice of the customer. Before job redesign he was the receiving inspector with no discretionary duties, worked within a narrow task structure and was unable to respond to the voice of the customer; not allowed to perform Root Cause Analysis (RCA); subject to the customer “finding” problems rather than their discovery within the production facility; and was thrust into a reactive role.

After the job redesign, he was a supplier quality technician with greater autonomy working in a broad task structure and was able to react to the customer’s needs. He was allowed to perform RCA, could use problem-solving teams to solve customer concerns and was able to be proactive.

The value proposition for Tool 6 is that job redesign empowers the employee and restores the ability to solve problems by asking questions.

Tool 7. Organizational Climate Tool—Organizational Climate

Organizations often state that “Our motto is our customers come first.” Yet, when observed, they seem to have an unwritten rule that we do not talk to the customers. Why is that? How can a customer’s needs be known if we are not allowed to ask them about those needs?

The key in developing the voice of the customer is to have an organizational climate that empowers the workforce. First, we define organizational climate as a relatively enduring quality of the organization’s internal environment experienced by its members that influences their behavior and can be described in terms of a particular set of the organization’s characteristics or attributes (See Renato Tagiuri, “Organizational climate; explorations of a concept,” research paper, Harvard Business School, 1968).

But as Norman E. Bowie noted in his article, “A Kantian Theory of Meaningful Work,” in the July 1998 *Journal of Business Ethics*: “The United States government established the [Malcolm] Baldrige Awards for quality. It is interesting to note how many of the good practice criteria refer not to the product itself but rather to how employees are managed.”

The value proposition of Tool 7 is that nurturing an organizational climate promoting intimate interaction with the customer is key to developing the voice of the customer.

Conclusion

The seven tools that have been presented show an iterative flow of understanding from self to others so that we can ask better questions that will result in better outcomes.

Each tool allows the user to explore the vertical aspects understanding as well as horizontal components. Asking better questions requires rigor in its approach and application.

Accordingly, the tool box and these seven tools will provide the user with the means to develop a greater intimacy with the customer by better understanding their needs. The voice of the customer is not merely a set of tools, but a means to empower employees to use one or more options in the tool box to ensure that the customer’s voice is heard.

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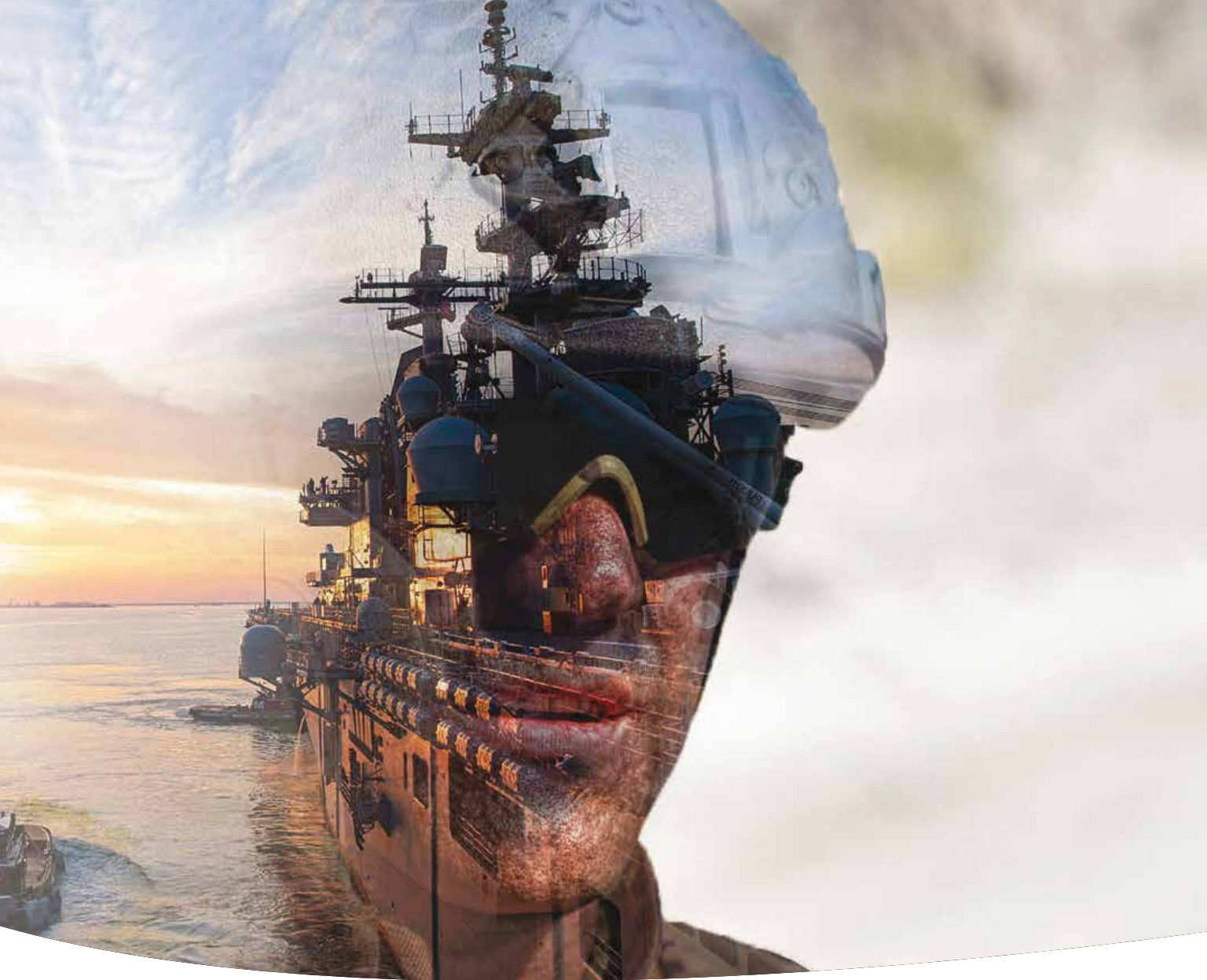


OUTPERFORMING With Doctrine, Not Science

Larrie D. Ferreiro

THE COLD WAR PARADIGM OF DEFENSE ACQUISITION CAN NO LONGER KEEP THE UNITED STATES ahead of its near-peer competitors. During the Cold War, the Department of Defense (DoD) was able to out-science its adversaries, because it was the world's biggest investor in, and consumer of, advanced science and technology (S&T), and could set the agenda for what commercial industries produced. Today, the DoD's share in the global S&T market is small and shrinking fast. In the future, the DoD no longer will have exclusive access to these technologies that once gave it the edge over potential adversaries. Instead, the DoD must return to an even older, pre-World War II paradigm: We must out-doctrine our potential adversaries by adopting and

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adapting commercial S&T for the battlefronts—and do it faster and more efficiently than our competitors.

The Cold War Acquisition Paradigm, Simplified

During the Cold War, the defense research and development paradigm, greatly simplified, was as follows: The DoD forecast what threat would exist in 10, 20, and 30 years, and the research and development (R&D) planning was set up to match the threat and develop the required technologies. The classic example for this is the Second Offset Strategy. The Soviet Union always had more troops and conventional arms than did NATO. The first strategy to offset that advantage—build more nuclear weapons—failed when the Soviets matched our production. So, in 1975 the DoD started on what we now call the Second Offset Strategy, at the time called a Long-Range Research and Development Planning Program run by the former Advanced Research Projects Agency (today the Defense Advanced Research Projects Agency), because we had to out-science

them and out-technology them. We identified and developed over the next two decades the kinds of technologies that would allow us to outperform the Soviets, including stealth, microprocessors, software, the beginnings of the Internet, and long-range cruise missiles.

One example: The U.S. government needed better microprocessors in order to have lighter cruise missiles, ballistic missiles, and other kinds of equipment that had to rely on software, so they could not use regular transistors. In the 1980s, the U.S. Government underwrote a company called SEMATECH, or Semiconductor Manufacturing Technology. It was about \$100 million a year (which was not much money even then), with the stated reason that the United States had to compete with Japan. Behind the scenes, the DoD needed to hurry the development of microprocessors that could fit on ballistic missiles and cruise missiles and all these other electronics that were needed in order to achieve this second offset. That seed money got many commercial companies involved in

developing microprocessors, of which the DoD was the major consumer. In turn, companies began radically reducing their costs for miniaturization, which in turn reduced the cost to the DoD. At the same time, these technologies were essentially out of reach for the Soviet and Eastern Bloc nations, both because of strict controls by the West, as well as self-imposed communist-bloc quarantines of decadent Western influences such as computers.

This paradigm worked: These science and technology investments came to fruition in the 1980s—in 1989, the Berlin Wall collapsed, and within 2 years the Soviet Union collapsed. This paradigm worked because the DoD was able to leverage its own R&D investments to change the face of technology worldwide. In the 1970s, for example, the DoD owned 10 percent of the world's R&D budget, a substantial amount of leverage.

advantage. And it was quite a contest. By the way, spoiler alert, in none of those cases did the United States initially lead the pack. However, the United States did eventually learn and outstrip its competitors.

One particular example involves the aircraft carrier. The United States, France, Germany and Britain were all looking at the commercially developed airplane as a military weapon, but no one was quite sure how to use it at sea. There was a long period, primarily between World War I and World War II, where the navies did a lot of work to slowly but surely develop the ideas of how this would operate, develop the doctrine, develop the methods of taking off and landing, of how it would be used in warfare. The navies did a lot of wargaming and operational fleet exercises. That was the key to adopting a new technology. It was not simply somebody looking at it and thinking, "This is a great

It was the commercial sector that developed the Maxim machine gun in the 1880s. It was the commercial market that developed the wireless radio a decade later. It was the commercial world that developed the airplane

The Pre-World War II Paradigm, Simplified

World War II marked the start of heavy government investment in research and development, especially military. Earlier, the largest part of the U.S. research budget was devoted to agriculture, so very little of the Army and the Navy budget actually went through what today we would call R&D.

For something like 180 years of the United States' existence, we looked at the commercial sector to develop the technologies that would change the way we fought. That was not simply the United States—Britain, France, and Germany were all operating the same way. They all relied very heavily on their commercial sectors to develop these technologies. As these commercial technologies were developed, the militaries would look at how they would be adapted to the military manner of fighting. It was the commercial sector that developed the Maxim machine gun in the 1880s. It was the commercial market that developed the wireless radio a decade later. It was the commercial world that developed the airplane in the 1900s. At each point, the militaries tried to use these new inventions, but it was the nation that could adapt its own doctrine fastest to those new technologies that gained the greatest military

idea. Let's do it." There usually was a careful process of trying it out in different scenarios, taking lessons from the operational experience or the wargaming experience, folding it back into the technology, and then, eventually, making it part of the fleet. That is a fairly systematic way of thinking about how an organization can change its paradigm—not in one fell swoop but by actually thinking carefully about which inventions, technologies and concepts would change how they fight, try them out, and then go back and revise the doctrine. This process is very similar to modern agile development in software, but of course on a longer scale—not weeks as with software, but rather months and years.

What Has Changed, What We Must Do

In the 1970s, the DoD was the single biggest player in the R&D world—10 percent of the total was a big lever—and it was able to wag the tail (so to speak) of R&D investment globally. The trend today is that the DoD owns less and less of the world's R&D budget, and the leverage is simply not there—the DoD is now just a few hairs on the tail of the dog. In 2010, it had 5 percent of the world's total, about \$80 billion out of \$1.6 trillion. In 2016, it was 3.5 percent of the world R&D total, and it continues falling. So, the DoD's ability is somewhere between limited to almost nonexistent to influence R&D investments and,

for that matter, investments in very specific parts of technological development. Today, almost no federal money goes into microprocessor research.

The DoD needs to reconceptualize how we approach defense acquisition. Instead of taking the doctrine that we imagine we will have in 10 or 20 years and developing the technologies and the engineering to fulfill that doctrine, we should develop new doctrines based on the technologies and developments appearing in the commercial sector. In other words, we need to do something like the reverse of what we are doing now.

The DoD needs to look at what is present now, what is present in the next few years, and try to decide: What can we do with it? How can we establish the kind of doctrine for fighting that would take advantage of these new technologies? It may not be what we predicted. One example is the self-driving vehicle, which is coming along faster than we had ever imagined. Had we been following the standard military R&D course, we would have put in place a plan to develop autonomous capability that would arrive at some endpoint 20 years from now. We will get there much faster if we look at what the commercial world is doing, follow it, figure out where we can adapt what is happening now, and if, instead of dictating the requirements for creating a technology, we take those emerging technologies and decide how to use them on the battlefield.

None of these ideas by itself is greatly different from what we do today. It is quite common for new technologies to be folded into the way we fight. In order to make those new concepts fit into an acquisition system, we must rethink how we do large-scale acquisition for high-value platforms. This final piece will require the greatest institutional shift.

We have believed for a very long time that economies of scale will reduce cost. We buy 1,000 aircraft or 500 aircraft in the belief that once we have got the industrial process established, we have learning curves and other factors that will drive down cost. It has never worked quite that way, because in so many cases, the 50th and 500th unit to come off the military production line does not resemble others produced in the same very standardized way as in the case of a Ford, Hyundai or Apple product. The savings from building 500 aircraft or 50 warships probably are not nearly as much as are often advertised, when you look at the actual return costs.

The other problem with buying 500 aircraft at a time is that, if your technology isn't there at the beginning, it's not going to get there at all. Therefore, as every program manager knows, we must race to get all the technologies into one platform. If we went to a paradigm where the number produced came down dramatically, so that

we plan to buy 500 aircraft in a series, perhaps 20 or 50 at first and then move to the next step or amount in the series, the pressure would be reduced to get the latest technology into that first particular series. There is often an argument that aircraft are already produced in blocks or flights, so you have a block one version of the F-35 jet fighter, a block two version, etc., and, while there are technology insertion points, the major parts of the aircraft really don't change. The airframe can't really change that much. The engines can change but not by much. The gross takeoff weight can't change much. For a ship, the same rules apply.

'Plug and Play' Flexibility

For these high-value platforms, the technologies are often in the mission systems and the software. The goal should be to make the platforms more flexible to allow "plug and play" over long periods. It probably makes more sense to think, not about the flexibility of the individual platform or the individual aircraft, but rather the flexibility of the entire series of platforms. As a new fighting doctrine evolves, a new line of aircraft, ships and other platforms can be developed, if not in real time, certainly in a way that is more adaptable to these evolving technologies and ways of fighting. This would allow quicker technology insertion and doctrinal change. These faster adaptations would enable far more rapid testing of the technology—and would get us to where we want to go more efficiently.

As we think about how we will offset the near-peer competition, we find that our near-peer competitors are quite capable of developing most of the technology, and, quite frankly, in some cases developing it faster than we do. The same commercially developed technologies available to the DoD almost certainly will be available to everyone, including our competitors. The real question is not who will be able to outproduce or out-science or out-technology, but who is going to be able to out-doctrine?

The DoD needs to consider adopting a much different defense acquisition paradigm, especially in the new balance-of-great-powers environment. The capabilities and technologies available to the DoD will not be terribly dissimilar from those available to our near-peer competitors. Instead, we must adapt our ways and means of deterring war and conducting war (i.e., doctrine) so that it outpaces that of our potential adversaries. The DoD needs to leave behind the notion of trying to project 20 years into the future and develop technology accordingly. It must instead figure out what our current and near-term technologies let us do, and adapt our defense acquisition and doctrine development process accordingly. This new process will get us inside our peer competitors' OODA loop—observe, orient, decide, and act—much faster.

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Big Data Meets High-Performance Computing

*J. Michael Barton, Ph.D. ■ John R. Wallace
Raju Namburu, Ph.D.*

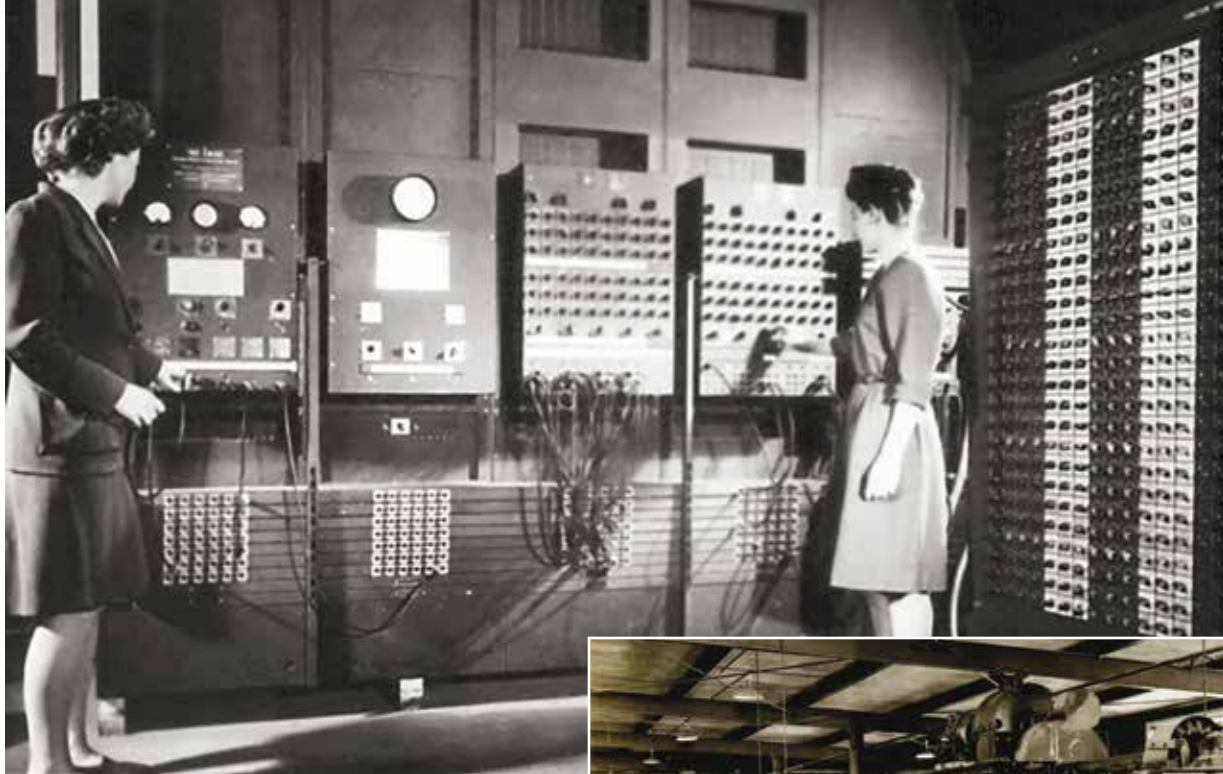
BIG DATA AND HIGH-PERFORMANCE COMPUTING (HPC) ARE common topics in technical circles and the popular press. We read about social media, e-commerce, server farms, cloud computing and mobile computing. In fact, we do more than just read about them; we use them daily, performing Google searches at work, watching a Netflix movie on our smart phone, connecting with friends and family via Facebook, buying goods on Amazon, and in a host of other activities. It isn't merely convenient or social or trendy; it's very big business based on the wealth of data collected from these activities and enabled by massive computing resources spread all over the world—big data meets high-performance computing. It's big business because analysis of the data allows purveyors of goods and services to target our specific interests. Retailers pay well for this access to our buying potential.

The Department of Defense (DoD) has analogous challenges. The Army Research Laboratory (ARL) employs graph algorithms to analyze e-mail, social network, and other patterns to identify potential tactical threats and threat precursors. The Test and Evaluation (T&E) community tests every weapon system, network, application, piece of equipment, communication device, data link, etc., and measures everything conceivable to assess its effectiveness, suitability, survivability and safety. These requirements produce massive, heterogeneous, distributed data sets requiring new approaches for analysis and exploitation. A larger challenge still is the growing number of requirements for time-critical analysis and how to use HPC resources for them. Within the acquisition life-cycle, T&E is the single largest producer of data.

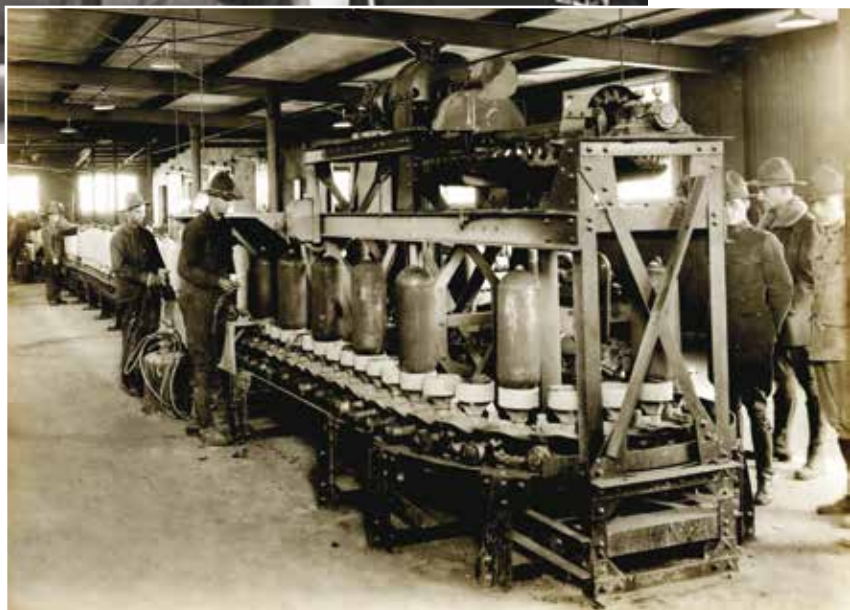
Barton is Chief Technologist and Contractor (Parsons) for the U.S. Army Research Laboratory Computational Sciences Division, Aberdeen Proving Ground (APG) in Maryland and holds a Ph.D. degree in Engineering Science and Mechanics from the University of Tennessee-Knoxville. **Wallace** is the Technical Director of the Aberdeen Test Center, APG. He holds a Bachelor of Science degree in Electrical Engineering from the West Virginia Institute of Technology. **Namburu** is the chief scientist of the Army Research Laboratory Computational and Information Sciences Directorate, Adelphi, Maryland, and holds a Ph.D. degree in Mechanical Engineering from the University of Minnesota.







Above: Programmers operate the main panel of an early computer from the 1946-1956 period. Right: Bombs are processed at an Aberdeen Proving Ground munitions plant in Maryland, November 1918. U.S. Army photos from the archives of the Army Research Laboratory's Technical Library.



We place ever-increasing computational capability into tactical devices and develop tools to allow the soldier to exploit the morass of data for improving situational awareness and decision making. The number of computing devices, their speed and capacity, the network bandwidth connecting them, and the data accessible present challenges and opportunities. How do we harness this distributed, dynamic computing capability which exists in a power-constrained environment; how do we apply it for solving problems to help the soldier; and how do we do all this in a meaningful tactical time frame? This is yet another meeting of big data and high-performance computing.

This glance back and view forward are especially appropriate since in 2017 we observed the centennial of Aberdeen Proving Ground (APG), the 70th anniversary of the first general purpose scientific computer (that was located at APG), and the 25th anniversary of ARL itself. One element has remained constant over the last 100 years: APG has many stakeholders yet only one customer—the soldier.

A Little History

The U.S. Army Research Laboratory and U.S. Army Aberdeen Test Center (ATC) share a common origin dating from U.S. involvement in World War I. Congress moved the ordnance testing facilities from Sandy Hook, New Jersey, to Aberdeen, Maryland, due primarily to Sandy

Hook's limited range capabilities and to the wartime congestion of New York Harbor. The transition began at the end of 1917, and by Jan. 2, 1918, the first test round was fired at what is now APG. Nine divisions comprising the Proof Department were eventually established at the new proving ground.

In 1935, the Ballistic Section was removed from the Gun Testing Division and named the Research Division, which in 1938 became the Ballistic Research Laboratory (BRL). A series of reorganizations and another world war saw the Proof Department become the Ordnance Research and Development Center (ORDC), which included BRL, Development and Proof Services, and the Aberdeen Ordnance Depot. In 1962, the Army Test and Evaluation Command (TECOM) was stood up as the higher headquarters of ORDC and the Development and Proof Services was renamed the Materiel Test Directorate. In 1992, BRL was stood down and the ARL was activated, consolidating eight separate laboratories with other Army research elements.

In 1995, the Materiel Test Directorate became the U.S. Army Aberdeen Test Center.

Today, ARL is the Department of the Army's corporate laboratory, the Army's sole fundamental research laboratory focused on scientific discovery, technological innovation, and transition of knowledge products. ATC, one of eight Army Test and Evaluation Command (ATEC) test centers and subordinate commands, has the mission to validate that equipment tested performs as intended, is safe, and that capabilities and limitations are known during the developmental testing of soldier systems, automotive systems, ballistics and survivability tests. ATC performs 25 percent of ATEC's total workload.

Avalanche of Data

There is no single big data problem, hence no single solution. Even the term "big" is misleading, implying magnitude only. Certainly data Volume (how much data), which is growing exponentially, is a constant concern; however, a collection of Vs characterizes big data: Velocity is the speed at which data arrives and the speed with which decisions based on it must be made. Variety refers to the heterogeneity of storage platforms, data types, representation, semantic interpretation and security classification or other distribution limitations. Veracity is the trustworthiness of the data, its error and uncertainty and its provenance. Value represents what the data is worth in its native state and when aggregated. Value increases from integrating, analyzing and applying the data. The five Vs of big data represent characteristics that help users identify their big data problem and assist in defining the right tools and approach.

For ARL big data means a computational sciences research program in four priority areas to support our stakeholders: large-scale computing (hardware, algorithms, software, networks), convergence of HPC and big data (hardware and software architectures and programming approaches), time-sensitive analysis (real-time, time-critical, and on-demand requirements), and tactical computing (locality-aware applications and cognitive devices that accommodate dynamic resource constraints). Big data also means physics-based modeling and simulation in aerodynamics, combustion, materials, structures, meteorology and other domains. These computations are like a gas that expands to fill any volume enclosing it. The HPC resource is the volume and the computation is the gas,

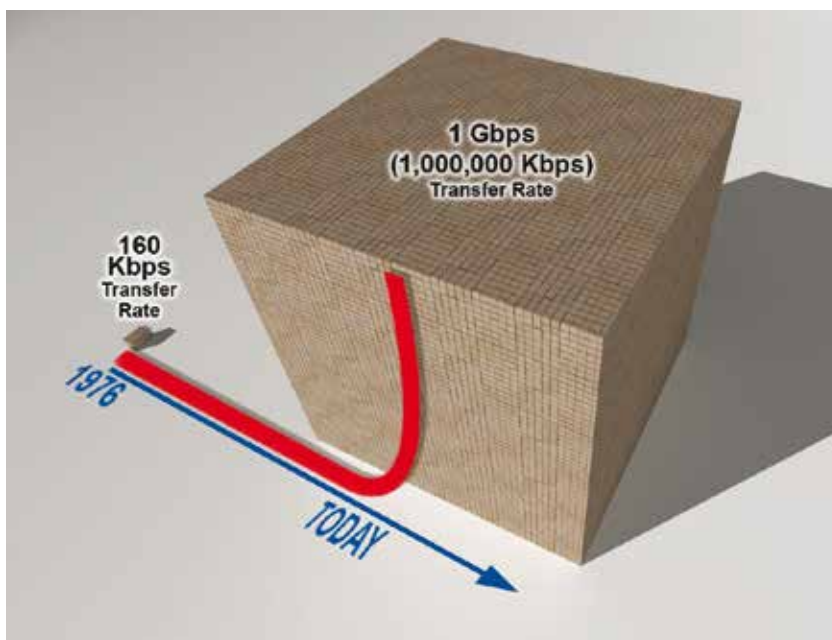
filling the entire computational volume no matter the size, one more ever-growing source of data.

Testing across the Army has evolved dramatically over the last 40 years. In 1976, instrumentation could capture data at rates up to 160 kilobits per second; today instruments routinely acquire data at 1 gigabit per second. Testing in 1976 was limited to isolated components and systems; today testing often includes networked systems of systems. In the future, vehicles will employ a network connecting all vehicle systems, such as fire control, vehicle control, and engine control. Every entity on the battlefield—soldier, vehicle, sensor, weapon, radio—is becoming a network node, the tactical Internet of Things. Each progression of integration, communication, and connectedness brings more interfaces and interactions, increased complexity, and an avalanche of data. The amount of instrumentation required is becoming overwhelming, and the instruments acquire data at staggering aggregate rates. Today, a Network Integration Evaluation (NIE) event can produce hundreds of millions of network packets per day, all of which must be time stamped, location registered, direction of arrival reconciled, and reconstructed to build messages and message threads. Dedicated high performance computing is required to meet the analysis demands and timelines of today and the future.

Scientific Computing

Just as there is no generally accepted definition of big data, the same holds true of a high performance computer. In

Figure 1. Meteoric Rise of Data Collection Over the Last 4 Decades



Source: Army Research Laboratory

1993 a collection of benchmarks was proposed to assess the performance of computers on compute-intensive problems. The benchmarks are now known as the TOP 500, and twice a year a list of the top 500 computers in the world is published. These are certainly high performance computers, but by no means the only ones. They all have one thing in common, however. They trace their roots to the first general purpose scientific computer, the ENIAC (Electronic Numerical Integrator and Computer), designed and built by the University of Pennsylvania Moore School of Electrical Engineering for BRL. The ENIAC became operational in 1946 and was moved to APG in 1947. BRL custom design and development of computers, with origin in the development of firing and bombing tables, ceased in 1976 with the acquisition of a CDC Cyber 7600. Commercial development of scientific computers supplanted custom development.

Congress established the High Performance Computing Modernization Program (HPCMP) in Fiscal Year 1992, and the DoD in response stood up the High Performance Computing Modernization Office in 1994 (now called the High Performance Computing Modernization Program Office). Shared resource centers were created and furnished with high performance computers connected to users via high bandwidth networks. A staff of resident subject-matter experts was hired, commercial applications software was made freely available, and a series of user software initiatives was funded. The HPCMP is the primary source of HPC resources in the DoD today, serving the science and technology, test and evaluation, and acquisition communities. ARL operates one of four HPCMP DoD Supercomputing Resource Centers. ARL also hosts dedicated HPC platforms for stakeholders, such as ATC, which has used dedicated HPCs for large-scale data analytics since 2003.

Challenges and Successes

An example from the ATC is illustrative. Recognize that the example is more than 10 years old yet vividly demonstrates value from large-scale data analytics and the success of the T&E community in using it.

ATC conducted a study with the Department of Transportation and a major truck manufacturer for tractor-trailer vehicle fleet analysis. ATC has developed black box instrumentation, referred to as the ADMAS (Advanced Distributed Modular Acquisition System) family, for data collection. The ATC fleet analysis study installed ADMAS devices on 80 trucks to collect data, utilized a cellphone network to transfer data in bursts back to ATC, and employed proven ATC data management tools to store, analyze and visualize the results. The study was successful in elucidating how to better employ the fleet of trucks to improve efficiency. An unintended benefit was also derived through examining accidents. The data included

sufficient detail for analysts to identify driving behaviors that led to the accidents in some cases, and propose changes in driver practices to reduce the number of accidents. This was not a requirement of the study. Yet even in this small-scale effort, the data added value through mining.

We can extrapolate the ATC truck example to the more recent Mine Resistant Ambush Protected (MRAP) vehicle. Data were collected across the vehicle life cycle: early system development, developmental testing, live fire testing, operational testing, training, and in-theater operations. ATC has 20 terabytes (TBs)—or over 20 trillion bytes—of MRAP automotive data from developmental testing, training data from 161 vehicles operating for 47,630 miles, and 15 TB of in-theater data from 337 instrumented vehicles operating for 267,385 miles. Besides collecting in-theater automotive performance data, such as engine parameters, terrain profiles, ride quality information, and environmental temperature, the vehicles are equipped with accelerometers that characterize the response to an explosive impact or rollover event. These results are then compared to live-fire vulnerability data from ATC tests enabling forensic analysis of the events and improving future designs. But what else resides in that data? The data are so massive that traditional means cannot yield the desired results in a timely manner.

The Army conducts NIE exercises for up to 6 weeks annually, with as much as 2 TB of data collected daily. The Volume, Velocity and Variety of data are key challenges. In 2012, software developed by ATC and ARL for HPC processing allowed data reduction times to be improved by an order of magnitude, from 60 hours per TB to 5 hours per TB. For the first time, results from one day were able to be analyzed in time to favorably impact the following day's events. The results were so successful that the software was employed for Warfighter Information Network-Tactical (WIN-T) tests in the fall of 2016 and continued in 2017 during NIE.

Not Your Grandma's Supercomputer

Throughout the ATC and ARL partnership, each generation of HPC has addressed a different stage of the test and evaluation data flow. The first consolidated multiple stores of data into a single structured query language (SQL) database and integrated it with Google Earth and other tools for improved analysis and visualization of automotive testing. This industry standard database technology served ATC well for years, until data reduction, not data access, became the new limiting factor for timeliness. As a result, ATC and ARL rewrote the software for parallel implementation, developed new visualization tools, and enabled the successful application to Army networked systems tests.

Looking to the future, other latency in the data flow arises from querying the database; this process has remained serial through all previous improvements. Additional latency is caused by movement daily of tens to hundreds of gigabytes of reduced data to a small cluster used by analysts. The resolution to these limitations is to leave data on the HPC and execute parallel queries there, both enabled by Hadoop and its associated software stack. Hadoop is open source software for distributed computing and data management used by such giants as Google, Yahoo and Netflix, based on MapReduce developed by Google. Hadoop provides a SQL query interface familiar to database analysts but within an interactive and parallel HPC framework.

The new fully parallel approach, when complete, enables preliminary test and evaluation results to be available to stakeholders at the end of each test day and promises another order of magnitude speed up. Besides application to future WIN-T tests, it will also be used to support the autonomous platforms, tactical vehicles such as Joint Lightweight Tactical Vehicle and combat vehicles such as Stryker.

Data will not stop growing and the demand for decisions based on it will only multiply. We are putting into place tools and processes to support acquisition, but what else awaits? There is an obvious challenge in processing still and video image data and integrating with other types of data in near-real time. Making current, historical, visible, discoverable and accessible all of the data is key to unlocking secrets in the data and making it available for future developments. Automated validation of all data is still beyond reach. Exascale computers (1,000 times faster than current HPCs) portend ever increasing heterogeneous and distributed resources, well beyond the multi-node, multi-core graphics processing unit (GPU) clusters of today. Many integrated core architectures, low power processors, new applications of Field Programmable Gate Arrays, quantum and quantum-like processors, application-specific HPCs, and neuromorphic chips offer dramatic potential while challenging our creativity to integrate the disparate technologies and develop software tools.

The ARL and the ATC are in a unique position at the intersection of big data and HPC. We bring a century of testing, analysis and scientific computing expertise to this challenge. The title of this article is thus misleading: big data and HPC are not meeting for the first time. They are old friends facing yet another challenge together.

On Jan. 2, 2018, a commemorative round was fired at ATC echoing the original round fired there a century earlier.

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SECTION 3685, TITLE 39, U.S.C. SHOWING OWNERSHIP, MANAGEMENT, AND CIRCULATION

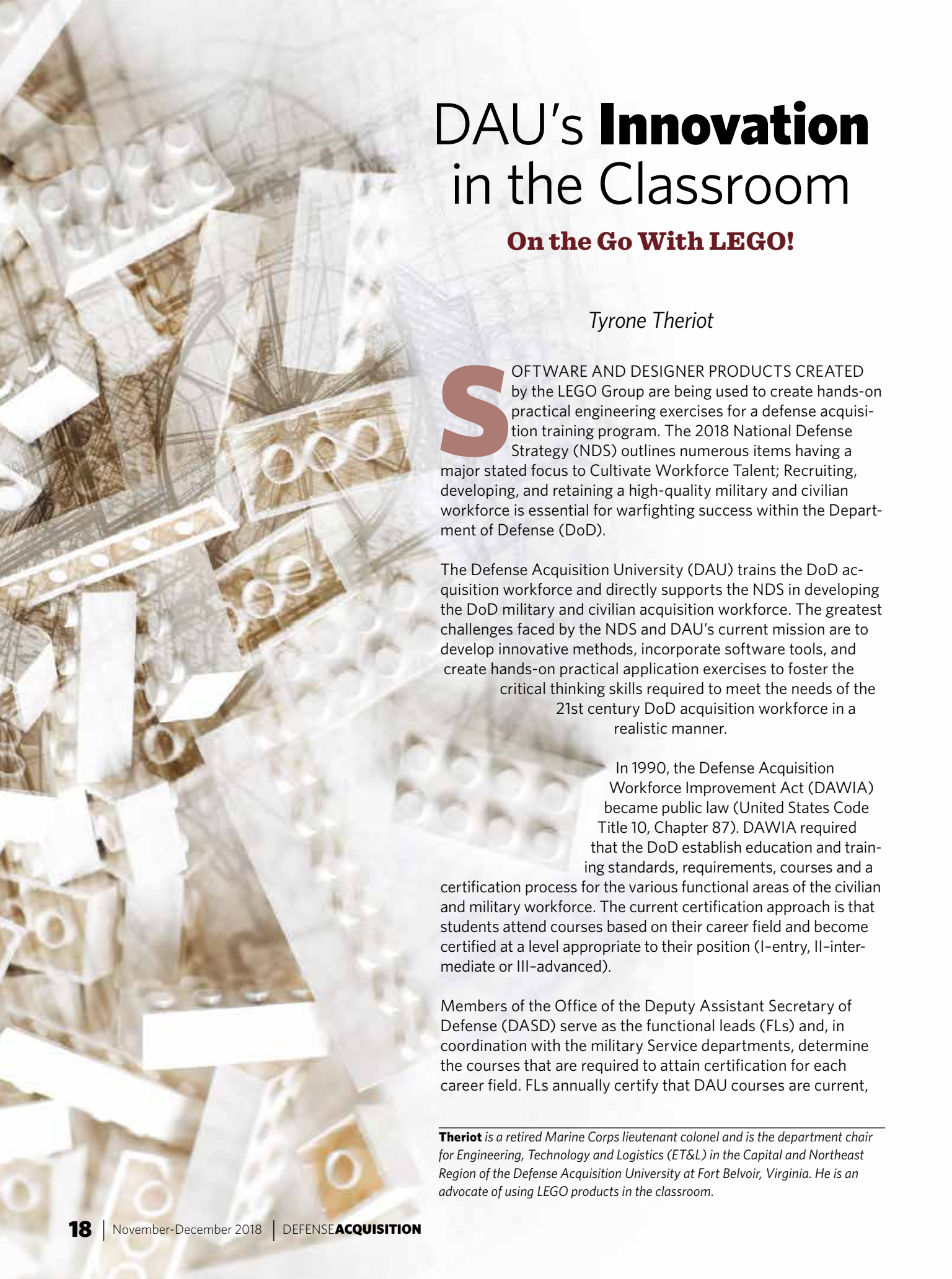
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DAU's **Innovation** in the Classroom

On the Go With LEGO!

Tyrone Theriot

SOFTWARE AND DESIGNER PRODUCTS CREATED by the LEGO Group are being used to create hands-on practical engineering exercises for a defense acquisition training program. The 2018 National Defense Strategy (NDS) outlines numerous items having a major stated focus to Cultivate Workforce Talent; Recruiting, developing, and retaining a high-quality military and civilian workforce is essential for warfighting success within the Department of Defense (DoD).

The Defense Acquisition University (DAU) trains the DoD acquisition workforce and directly supports the NDS in developing the DoD military and civilian acquisition workforce. The greatest challenges faced by the NDS and DAU's current mission are to develop innovative methods, incorporate software tools, and create hands-on practical application exercises to foster the critical thinking skills required to meet the needs of the 21st century DoD acquisition workforce in a realistic manner.

In 1990, the Defense Acquisition Workforce Improvement Act (DAWIA) became public law (United States Code Title 10, Chapter 87). DAWIA required that the DoD establish education and training standards, requirements, courses and a certification process for the various functional areas of the civilian and military workforce. The current certification approach is that students attend courses based on their career field and become certified at a level appropriate to their position (I-entry, II-intermediate or III-advanced).

Members of the Office of the Deputy Assistant Secretary of Defense (DASD) serve as the functional leads (FLs) and, in coordination with the military Service departments, determine the courses that are required to attain certification for each career field. FLs annually certify that DAU courses are current,

Theriot is a retired Marine Corps lieutenant colonel and is the department chair for Engineering, Technology and Logistics (ET&L) in the Capital and Northeast Region of the Defense Acquisition University at Fort Belvoir, Virginia. He is an advocate of using LEGO products in the classroom.

technically accurate and consistent with DoD acquisition policies for each career field.

One of the principal resident courses taught by DAU for workforce members in the engineering competency to achieve ENG level II certification is ENG 202, Applied Systems Engineering in Defense Acquisition, Part II. The course applies an engineering perspective of the acquisition process and the students are provided scenarios to work through engineering-specific activities, such as performance trade-offs, across each phase of the acquisition life cycle. DAU faculty members identified this course as a fundamental requirement for all engineers and as a course that would benefit from innovative methods and tools in meeting the NDS objective to streamline rapid, iterative approaches from development to fielding. Achieving that competency will enable intermediate-level engineering workforce members to apply what they learn in the classroom when they return to their program offices.

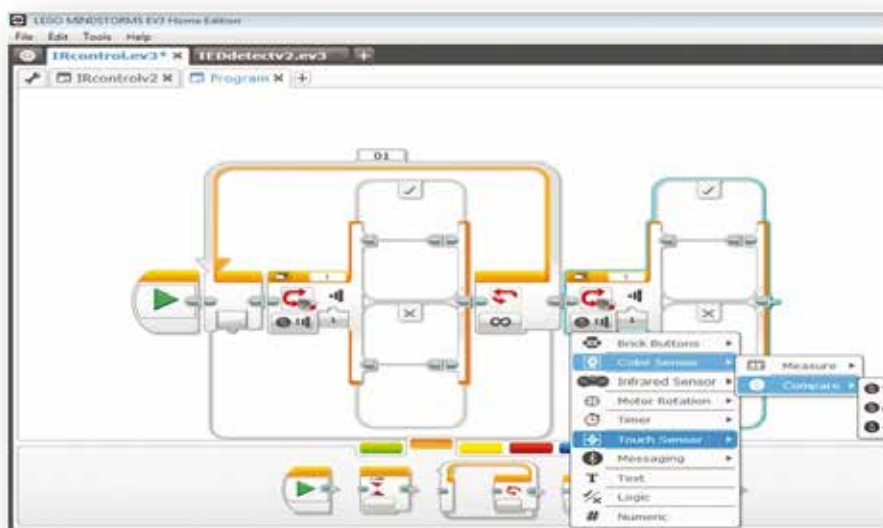
Faculty members discussed what tools would be beneficial at each stage of the acquisition life cycle, beginning with the materiel solution analysis (MSA) phase. The simplest way would be to use a systems engineering model or a digital engineering approach at a program's onset. The DoD Digital Engineering working group has stated that "The program should use a digital model to develop depictions of the system to support all program uses, including requirements analysis, architecture, design and cost trades; design evaluations; optimizations; system, subsystem, component, and subcomponent definition and integration; cost estimations; training aids and devices development; developmental and operational tests; sustainment and disposal." The challenge is to identify modeling and software tools that are realistic, cost effective and easy for students

to use. The tools also must support and enable digital engineering in order to be incorporated into ENG 202, starting at the MSA phase and continuing through the Operations and Sustainment (O&S) phase.

At DAU, we conduct a mission assistance workshop—the Engineering Management Workshop (EMW, Workshop Engineering, WSE-006, in the DAU iCatalog). The students use a LEGO MINDSTORMS EV3 Education kit to create a hardware design/vehicle and use the LEGO MINDSTORMS software language and modeling environment to develop software coding to program the vehicle to operate and perform specific functions. LEGO also provides a software tool called the LEGO Digital Designer (LDD) that supports a digital engineering approach as identified by the DoD Digital Engineering working group.

Currently, ENG 202 uses a modeling and simulation tool called DragonFly. This tool facilitates creating designs and conducting scenarios in which these designs are used in three student exercises (MSA, Technology Maturation and Risk Reduction [TMRR] and Engineering and Manufacturing Development [EMD]). However, DragonFly does not address all aspects of digital engineering as defined by the DoD Digital Engineering working group, nor are the students able to physically build a vehicle or translate a design from a model into a physical product. The idea emerged to incorporate the LEGO products into ENG 202, including the LEGO Digital Designer (Modeling and Simulation tool/Computer-Aided Design/Computer-Aided Manufacturing), LEGO MINDSTORMS EV3 Education kit (physical product with hardware and software), and the LEGO MINDSTORMS software language and modeling environment (software development tool). See Figure 1.

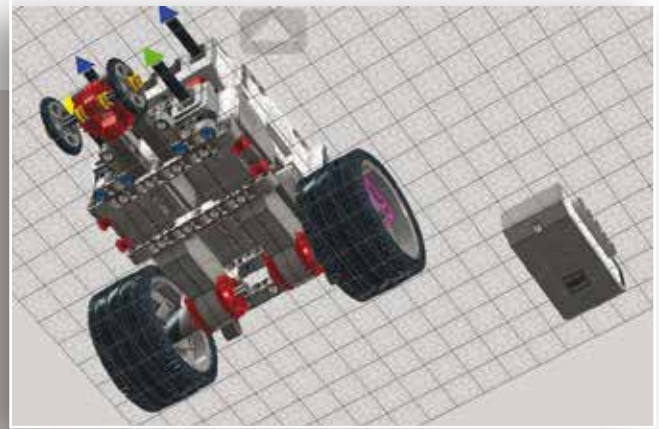
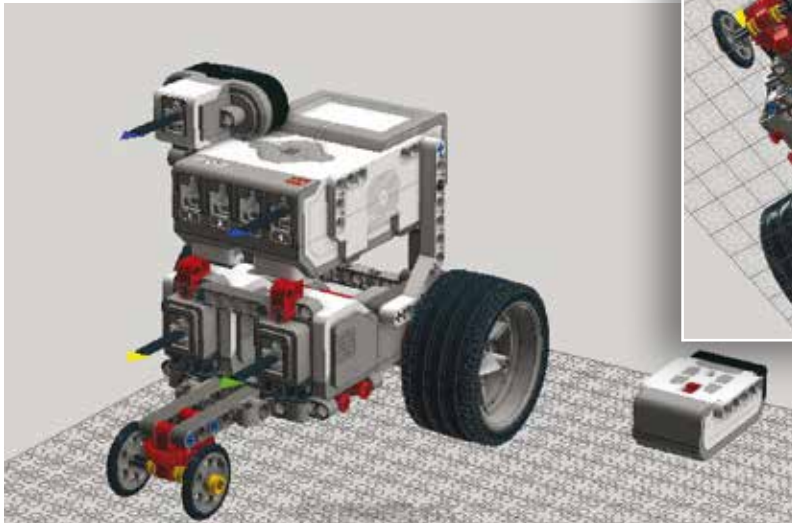
Figure 1. LEGO Software Modeling



Source: The author

A pilot effort on July 16–20, 2018, incorporated these innovative tools (LEGO products) into ENG 202. The pilot included a digital engineering approach as defined by the DoD Digital Engineering working group. In the MSA phase, students were provided three designs (Track, four-wheel and three-wheel designs) in the LDD in order to evaluate each digital design and to determine which would meet the initial requirements. Students conducted an engineering analysis to down-select one of the designs, leaving two designs for a later review.

In the TMRR phase, students were able to adapt their designs in the



Views of Four-Wheel Design

Source: The author

LDD but also had an opportunity to physically build the designs (prototyping and experimentation) using the LEGO MINDSTORMS EV3 Education kits and to perform sub-component testing. In order to move forward in this phase, students were required to evaluate and modify designs, conduct performance trade-offs, maintain configuration control of the digital and physical designs, and down-select to or, by process of elimination, pick one design.

In the EMD phase, students were presented with a reduction in funds (budget reduction/mark) and challenged to plan a design in the LDD to meet a Joint Emergent Operational Need (JEON). Students were to determine if the JEON could be incorporated within the existing design or could only be planned in the LDD for a future delivery.

In the Production and Deployment phase, instructors conducted a Physical Configuration Audit (PCA) of the student's design that included a review of the LDD drawings, bill of material, assembly/disassembly instructions along with the student's demonstration of the process used to build their chosen design within a specific time frame.

Finally, in the O&S phase, students were provided information from field units to upgrade the software, replace the batteries and replace parts from their chosen design. Students used the LDD and the LEGO MINDSTORMS EV3 Education kits in developing the procedures to conduct these events. From start to finish, this was a hands-on practical application course utilizing innovative tools within the classroom.

DAU recognizes the challenge presented by attempting a classroom simulation of the program office problems across the acquisition life-cycle. Incorporating innovative methods and using a hands-on practical application enables DAU to come as close as possible to the standard program office environment. Decisions must be made in a

short span of time with only the information available and designers must live with the decisions made at each phase.

ENG 202's use of the full array of LEGO products (LEGO Digital Designer, LEGO MINDSTORMS EV3 Education kit, and the LEGO MINDSTORMS software language and modeling environment) is a pilot effort, and we are looking at other courses and workshops to determine the potential value of using LEGO products or other tools.

Pilot efforts afford us the opportunity to move forward with innovation and determine the usefulness of this hands-on approach for DAWIA classes. ENG 202 is the first attempt with a DAWIA class, and there is still work to be done to determine the road ahead regarding the purchase of additional LEGO products and getting approval to load these LEGO software tools onto the DoD network through a Certificate of Networkiness. During a recent Hot Topic Forum, Robert Work, former Deputy Secretary of Defense (DEPSECDEF), encouraged us to be willing to fail, fail, fail, in an effort to learn from these failures, in order to move forward with new and creative ideas.

Fortunately, using LEGO products in the recent ENG 202 pilot was a success, but true success will come only from standardizing this approach and applying it to as many DAWIA courses as feasible. This will enable DoD acquisition workforce members to apply what they learn through DAU courses and deliver products at the speed of relevance through their program offices.

For more information about DAU's effort to incorporate LEGO products into ENG 202, please contact the author at the e-mail address below. (Note: The program conducted by the DAU is not affiliated, sponsored or endorsed by LEGO Education or The LEGO Group.)

The author can be contacted at Tyrone.Theriot@dau.mil.

Setting the Standard for **Cyber** Safeguards

Smita Sharma

PROTECTING THE DEPARTMENT OF DEFENSE (DoD) information technology (IT) systems from cyber threats is a constant and daunting challenge, especially when those systems are extremely complex and security upgrades must be made at short notice.

Operating under the Defense Health Agency (DHA), Medical Logistics (Med Log) application development teams from the Joint Medical Logistics Functional Development Center found a way to meet the challenge when implementing new Defense cybersecurity measures on Functional Development Center's complex Med Log IT systems. Using a systematic, repeatable approach, the Med Log teams successfully upgraded their cybersecurity compliance status to the new DoD risk management framework (RMF) on six Functional Development Center systems in less than 2 years with minimal impact to the systems' users.

The systems are used by more than 24,000 people and process more than 940,000 supply chain transactions daily with annual supply requisitions valued at \$4.5 billion. The Functional Development Center, which provides DoD Med Log application development and sustainment, is a component of the DHA's Solution Delivery Division (SDD).

"The RMF allows the DHA to strengthen the cyber resilience of Med Log systems by reinstituting software and system engineering best practices and improving

Sharma is a member of the Stakeholder Engagement Branch of the Defense Health Agency's Solution Delivery Division. She covers advances in health technology solutions at military treatment centers worldwide.

management of the people, processes and technology affected by the Federal Acquisition System and the ever-increasing threats towards DHA,” explained Wanda Hazel, SDD Med Log information system security manager and Functional Development Center cybersecurity manager.

Before starting the authorization process, the Functional Development Center’s teams thoroughly reviewed the RMF, DoD Instruction 85101.01, which replaced the DoD Information Assurance Certification and Accreditation Process (DIACAP) in 2014. This review was done in order to align more closely with National Institute of Standards and Technology (NIST) guidelines used throughout the U.S. government and industry. RMF standards, Hazel explained, include more than 800 cybersecurity controls, whereas previous Certification and Accreditation Process guidelines featured a small set of controls. To ensure RMF compliance implementation and sustainment, the Functional Development Center required cybersecurity knowledge, skills and abilities as a contract award condition for the acquisition baseline guidance.

Working with the DHA Computer Security Division, a Functional Development Center Med Log team submitted the Narcotics Order Review and Approval (NORA) system as the pilot for the DHA’s RMF process, Hazel said. The team started their work on NORA in January 2015 and received the first DHA RMF authority to operate (ATO) the following August. Next, the team implemented RMF on the Theater Enterprise Wide Logistics System and the Major Defense Acquisition Program (Acquisition Category [ACAT] I) Defense Medical Logistics Standard Support (DMLSS) system, which consolidates numerous military logistics functions into a single application and database.

“We quickly recognized that a proactive commitment and careful planning of the work ahead would be critical to success, particularly when combined with other overlapping projects, such as modernization and technology upgrades,” noted John Dittig, DMLSS project integration manager. “Along with the system evaluations, the team was working to simultaneously incorporate technology upgrades, including Oracle, Windows servers and workstations and Linux,” he said. “Additionally, a new system was introduced during this transition to RMF, setting the stage to eventually transition functionality from these systems into a more modernized and effective user experience.”

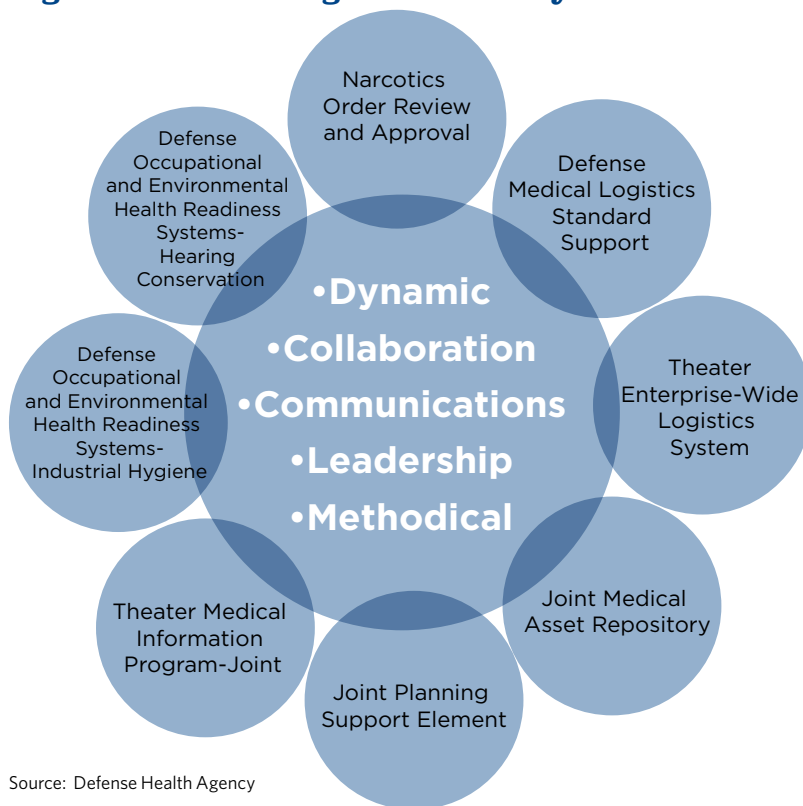
Team-to-Team Coordination

Different Functional Development Center RMF teams worked on each system, Hazel added, requiring continuous coordination between teams to avoid recurring missteps. Their ability to work smoothly across team lines enabled them to quickly implement the new cybersecurity measures on six additional systems, including two systems outside the Functional Development Center’s portfolio, before the end of 2017. (Figure 1)

“Dedicated leadership from the information system security officers enabled team members to establish open communications, reuse organizational procedure guides and share lessons learned,” she said. “The JMLFDC [Functional Development Center] teams’ preparation and efficiency gave them a significant push closer to receiving authority to operate.”

The other RMF authorized systems included the Defense Occupational and Environmental Health Readiness System Hearing Conservation, which collects, maintains, compares and reports hearing conservation, hearing readiness and deployment data for DoD personnel; Defense Occupational and Environmental Health Readiness System-Industrial Hygiene (DOEHRS-IH), used to manage occupational and environmental health risk data and actively track biological, chemical, biological and ergonomic hazards

Figure 1. Medical Logistics Team Dynamics



Source: Defense Health Agency

worldwide for the military and civilian population; DMLSS Customer Assistance Module, which allows DoD customers to download medical supply catalogs and place orders for medical supplies; Joint Medical Asset Repository, providing access to medical asset information 24 hours a day, 7 days a week; and the Functional Development Center's Production Support Environment, which delivers development and rollout support activities for several medical logistics systems.

Governance

The DoD RMF governance structure follows a three-tiered approach to cybersecurity risk management as defined by NIST Special Publication 800-53, the security controls catalog for all federal IT systems except those related to national security. The first tier is the Office of Secretary of the Defense, addressing risk management at a strategic and DoD enterprise level. Tier 2 addresses risk management at the mission and component areas. For this tier, a Principal Authorizing Official is appointed to oversee enterprise environment mission, business mission, warfighting mission and the DoD portion of the intelligence mission. The last tier addresses risk management at the system level. Governance in Tier 3 includes the authorization officer, program managers, system engineers and information system security managers.

RMF governance is important to cybersecurity, Hazel explained, because DoD IT includes hundreds of systems, services and products, and it is critically important to standardize the method for managing risks. Whether operated by the DoD or contractors on its behalf, RMF applies to all information in electronic format such as research, development, test and evaluation.

The RMF implementation also covers a wide range of activities, from policies, regulations and categories of affected DoD IT, to acquisition processes and transition timelines. RMF provides implementation guidance through a six-step process synchronized with the IT life cycle. The steps include:

- Categorize the system
- Select security controls
- Implement security controls
- Assess security controls
- Authorize the system
- Monitor security controls

The Process

After understanding the RMF accreditation requirements, the Functional Development Center teams employed a

Figure 2. Risk Management Framework



Note: CNSS Instruction 1253 provides guidance for RMF Steps 1 and 2 for National Security Systems (NSS). Key: FIPS = Federal Information Processing Standards; FEA = Federal Enterprise Architecture; SP = Guideline for Identifying an Information System as a National Security System.

Source: Defense Health Agency

proven methodology to meet the governance, risk management and compliance guidelines. Starting with Step 1, security categorization, the teams evaluated and recategorized systems ranging in size and diversity from single software applications to enclaves of more than 200 assets. They organized the systems into security categorizations based on their potential confidentiality, integrity and availability impact. (Figure 2)

In the next step, the teams identified, selected, tailored and documented the appropriate security controls to ensure that the systems' confidentiality, integrity and availability remained in accordance with the organization's day-to-day operations and protection strategy. Security controls were defined by low, moderate and high baselines. The information system owner, information security architect and the information system security officer were responsible for developing and maintaining security plans for each system. The teams, including system and database administrators, ensured that the systems were deployed and operated in accordance with the requisite security controls. After appropriate baseline and common security controls were identified and tailored, they were implemented.

Once implemented, security controls were assessed for effectiveness, Step 4. The assessments in this step were executed through Independent Verification and Validation evaluations, she added. This is a security posture examination performed by a third-party organization comprised of engineers and analysts. On the front end, project teams prepared their systems' security posture for evaluation. On the other end, the evaluators provided feedback and guidance on potential vulnerabilities and risks. Based on the final report by the evaluators, project teams formulated a mitigation and tracking plan around the identified potential vulnerabilities.

In Step 5, Hazel said that the systems were authorized by the DHA Deputy Assistant Director of Information Operations based on the effectiveness of their security controls with supporting mission and business requirements, technical constraints, cost constraints, and risk related considerations when performing security authorization activities.

In the final step, Hazel said that the Functional Development Center Med Log teams established procedures for continuously monitoring the systems to determine if the new security measures remain effective as software attributes change and as new threats to the environment occur.

As the teams progressed through each detailed step, they continually refined their processes, ultimately achieving authority to operate for all eight systems. Hazel said their repeatable process was so successful that one of the sys-

tems, DOEHRs-IH, completed its Independent Verification and Validation evaluation in a record 2 days.

End-User Impact

Hazel said that the biggest change to system users was the required two-step authentication common access card log in process, which replaced previous username and password-only log in procedures. She said that end users were notified of the new RMF controls, and the transition was relatively transparent. Throughout the RMF authorization process, she added, the systems remained online and users were able to access them.

Ultimately, Hazel said, the Functional Development Center teams' ability to coordinate and share lessons learned facilitated timely and efficient RMF implementation, ensuring that information flowing through medical logistics systems remained trusted, protected and available to end users. To avoid missteps, she encouraged other DoD activities to contact the Functional Development Center before instituting RMF requirements on their systems.

The Functional Development Center "set a new standard as the first DHA ACAT [Acquisition Category] I program to receive accreditation under the new RMF," noted Army Col. Richard Wilson, the SDD division chief. "Their ability to fully comprehend the RMF requirements was critical to developing an effective implementation strategy and executing it."

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A Reminder of Why We Do What We Do

Bill Kobren

REMEMBRANCE DAY. ARMISTICE DAY. VETERANS DAY. MANY names, but single-minded of purpose. Nov. 11 is a day to pause and remember. It is a day to join in solidarity with our countrymen and -women to remember the soldiers, sailors, airmen, Marines and Coast Guardsmen and -women who throughout our history have faithfully and honorably served our country. A day to celebrate and commemorate the selflessness of our American veterans. And to offer a silent remembrance for those who in the course of that service made the ultimate sacrifice on behalf of this great nation of ours.

Nov. 11, 2018, is a particularly important milestone, as it marks the day fully a century ago when the guns of the “Great War” of 1914–1918 fell silent; when the carnage of the first truly global conflagration drew to a close. The culmination of what was then called the “War to End all Wars,” and only later the First World War and World War I. Let us also pause to recall the millions of young Americans who served in Europe under Gen. John J. “Blackjack” Pershing from 1917–18, and particularly those soldiers, airmen, and Marines who served in major engagements on French soil 10 decades ago at Château-Thierry, Belleau Wood, Saint-Mihel, Meuse-Argonne, Montfaucon, Oise-Aisne, Cantigny, and Sommepey.

We honor their memory, their dedication, and their commitment. We honor the bravery of the Marines at Belleau Wood. The steadfast soldiers of the 3rd Infantry Division at Château-Thierry, forever remembered as the “Rock of the Marne.” The service of the 42nd “Rainbow Division,” among the first units of the American Expeditionary Force (AEF) to enter combat in France. The men of the “Lost Battalion” of the 77th “Liberty Division” in the Argonne Forest. And many others. So many others.

As acquisition and sustainment professionals, as Americans responsible for designing, developing and supporting the weaponry and materiel on which today’s young men and women depend, and as we each do our part to protect and defend our nation and its allies, let us take a moment to remember the valor of the millions who journeyed “over there”—and, perhaps more important, the tens of thousands who did not return. Permit me, if you will, to share a deeply personal moment in time when the reality and scope of their sacrifice—and that of so

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Above: Meuse-Argonne American Cemetery is the final resting place to more than 14,000 Americans that gave their lives in World War I.

Right: Reenactors and flag bearers participated in the 2016 Veterans Day Ceremony at Meuse-Argonne American Cemetery.

Photos courtesy of the American Battlefield Monuments Commission (ABMC)



many others up to the present day—was fully understood, recognized and gratefully appreciated.

Return with me some 20 years to Veterans Day 1998; to the 11th hour of 11th day of the 11th month, 80 years removed from the signing of an armistice in a railway car in the Compiègne Forest, marking the conclusion of the conflagration that began in Europe and quickly spread around the globe. Accompanied by a small cadre of elderly Frenchmen, the cemetery superintendent, and a handful of cemetery staff, our formation of airmen stood at rapt attention in the dimly lit chapel at the Meuse-Argonne American Cemetery-Memorial in northeastern France, prepared to honor those who had fallen there eight decades earlier.

The day had dawned chilly. Moments before, the late-autumn sun had begun to break through the morning fog. Below us, row upon perfectly lined row of graves spread across the immaculately landscaped valley, marking the final resting place of 14,246 Americans, including 15 Medal of Honor winners. Small French and American flags stood as silent sentinels on each grave to commemorate that exact moment.

"Most of those buried here lost their lives during the Meuse-Argonne Offensive of World War I," according to the American Battle Monuments Commission (ABMC),

the caretaker of "24 overseas

military cemeteries that serve as resting places for almost 125,000 American war dead; on 'Tablets of the Missing' that memorialize more than 94,000 U.S. servicemen and -women; and through 25 memorials, monuments and markers." Picture if you will an "immense array of headstones (which) rises in long regular rows upward beyond a wide central pool to the chapel that crowns the ridge. A beautiful bronze screen separates the chapel foyer from the interior, which is decorated with stained-glass windows portraying American unit insignia; behind the altar are flags of the principal Allied nations." It was upon this hallowed ground that we stood.

The Meuse-Argonne region is a quiet, and of late, peaceful corner of France. Comprised of "rugged hills punctuated by thick forests, meandering streams, marshes, rural farms and small villages," this pastoral setting is located just 26 miles north of Verdun, scene in 1916 of perhaps the most horrific sustained military encounter in the history of warfare. Almost 1 million French and German soldiers fell during 10 months of the most dreadful warfare imaginable. A mere 2 years later, a million young Americans from Gen. Pershing's AEF doggedly fought their way through the ever-present mud, artillery fire, machine gun nests, poison

gas, trenches, barbed wire, exposed ridgelines and steep ravines of the Argonne. Many of those young “Doughboys” were to become household names: Harry S. Truman. Sgt. Alvin C. York. George C. Marshall. Douglas MacArthur, George S. Patton, Jr., Frank Luke, Eddie Rickenbacker, Billy Mitchell. Most who served, however, were never destined for fame or fortune. Many were European immigrants to America. Few had ever been more than a few miles from home prior to returning to European shores to fight for their adopted country. And far too many remain on the Argonne hillsides, having never left again.

Sad to say, few Americans visit the Argonne battlefields these days. Perhaps the location is simply too remote. Four hours by car from Paris, it is an hour’s drive along meandering farm roads from the Paris-Metz Autoroute. Perhaps it is simply the passage of time. With the passing of Frank W. Buckles at the age of 110 in Feb. 2011, no American veterans remain who experienced firsthand the momentous events of the autumn of 1918. While the 1950–53 Korean War is often referred to as “the forgotten war,” arguably the moniker could just as appropriately be applied to the First World War. Few take the time to remember the carnage of the 1914–18 conflict, and sadder still, perhaps few really care to remember.

On this particular November morning, the cemetery superintendent requested that I lay the wreath during a brief ceremony marking Armistice Day, now commemorated as Veterans Day. Except for the tolling of the bell and the mournful notes of the chapel carillon, the air was still. The American airmen stood in tight formation. A few words were spoken about bravery and sacrifice, followed by the laying of the wreath. A salute. Taps was played, and then it was over. We quietly filed out. The handful of Americans followed the French down the road and through the cemetery gate to the small hamlet of Romagne-sous-Montfaucon, just a few hundred yards away. Behind German lines in September 1918, the town was liberated by the Americans in the weeks that followed. The romantic name belied the reality of a gritty, yet proud and welcoming, cluster of homes, almost too small to even be called a town.

Along the road through the village stood a small memorial flanked by French and American flags. Two members of the local Gendarmerie were positioned at each end of town, ostensibly to stop traffic, but there were no vehicles for them to stop that morning. The small cadre of American servicemen, each representing tens of thousands of “Doughboys” who had fought in this sector, formed up, and again came to attention. The mayor shared a few words in French. No translation was needed. Townspeople alternately read the names of 24 French Poilu, infantrymen from this seemingly unremarkable ville, who paid the ultimate price during the Great War. A wreath

was laid. “La Marseillaise” and “The Star Spangled Banner” were played.

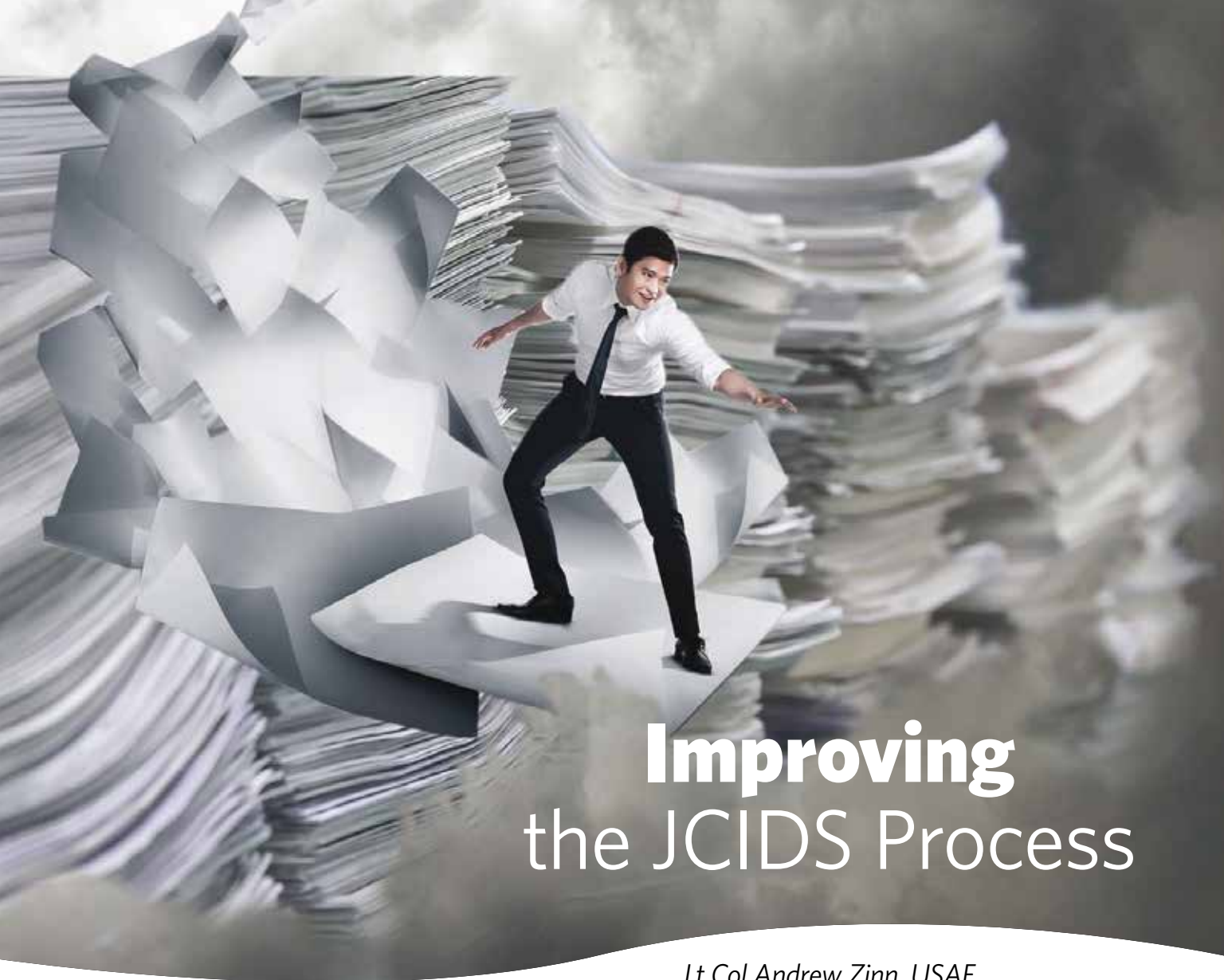
Tokens of Gratitude and Respect

As we broke formation, the mayor of the French village gratefully thanked each one of us, reminding me of a similar encounter just months earlier, when another mayor of a remarkably similar nondescript village had approached and hugged me following similar Memorial Day ceremonies at Normandy. He spoke no English, but with tears literally filling his eyes, he simply pressed into my hand photographs and a certificate with his signature affixed. I understood. He wanted me, as representative of the United States, to know, that his town had erected a small memorial to honor the cream of American youths who given their lives to liberate his town so many years earlier. On behalf of my country, I humbly accepted each of the small, yet incredibly meaningful tokens of respect. And I realized, yet again, why I had chosen to do what I do. Service, honor, freedom, liberty, bravery, sacrifice, integrity, dedication, loyalty, commitment, compassion, love of country. These are truly tangible things; things to be nurtured and treasured. Regardless of how each of us ultimately serves, they matter.

The millions of soldiers who gallantly fought upon this French countryside more than a century ago are gone now, but as long as those of us who honor their memory draw breath, they will not be forgotten. Their actions teach us that some things are more precious than life itself, and that “no greater love hath a man than he would lay down his life for his friends” are not merely words. Many of the men who rest along the placid hillside hard by Romagne-sous-Montfaucon, together with their allied comrades-in-arms, did just that. To be able to pay homage to those who paid that ultimate price, when few today actually take the time to remember, was—and still is—both an honor and a privilege I shall never forget. Our insignificant sacrifice of a mere few hours that brisk autumn morning pales in comparison to that made by those who remain still today in the Argonne. Yet it bestowed upon me a priceless gift I will long remember—and indeed cherish—for the rest of my days.

If I may be so bold, I would encourage each of us to resolve to do no less, as together we call to mind the selfless deeds of not only the World War I Doughboys, but of all who have served our great nation before and since. And perhaps pause for a moment to remind ourselves why we do what we do and more importantly, who we do it for. A fitting tribute indeed as together we celebrate the 100th anniversary of the conclusion of the “War to End All Wars” on this Veterans Day 2018.

The author can be contacted at bill.kobren@dau.mil.



Improving the JCIDS Process

Lt Col Andrew Zinn, USAF

FROM A WARFIGHTER'S PERSPECTIVE, CAPABILITY REQUIREMENTS GENERATION IS THE MOST IMPORTANT part in the comprehensive "big A" acquisition process of the Department of Defense (DoD). A weapon system's end user cares little about how it was acquired or where the money came from but is passionate about performance characteristics, survivability and maintainability.

One issue on which warfighters and policy makers agree is that the acquisition process takes too long. This is acutely relevant in an era when Silicon Valley can turn out disruptive products in a few weeks and rising powers like China and Russia are rapidly closing the gap in weapons system technology. Blame for this shortfall has traditionally rested on another corner of the acquisition iron triangle—the Defense Acquisition System and its maze of rules and regulations codified in the DoD Instruction 5000 series.

Lately, however, critics have turned their ire toward the process used to validate capability requirements, the Joint Capabilities Integration and Development System (JCIDS). One article suggested that JCIDS better stood for "Joint Cutting-

***Zinn** is an Air Force acquisition professional and is currently the commander of the 23d Analysis Squadron at the Air Force Technical Applications Center (AFTAC) at Patrick Air Force Base in Florida. He has served as an administrator of the Joint Capabilities Integration System (JCIDS) process while stationed at the Pentagon on the Joint Staff J8 (Force Structure, Resources and Assessment) in 2012–2015 and was a customer of the JCIDS process during multiple tours as a program office engineer. He is a 2018 distinguished graduate of the Army War College (AWC) in Carlisle, Pennsylvania. He would like to thank Lt Col Matt Edmonson, Joint Staff J8, and AWC Professors Lou Yuengert and Col Barrett Parker for their contributions to this article.*

Edge Ideas Death Sentence,” and consultant Thomas H. Miller recently called the process “bureaucratic and cumbersome” in an article published in the January-February 2017 issue of *Defense AT&L* magazine. From a review of the recent literature, it appears that JCIDS could be the primary cause of the relative reduction of U.S. military power and might just lead to the downfall of the Republic.

These criticisms are, for the most part, overblown. The reality is that, while not perfect, the JCIDS process is necessary and valuable—after all, it has helped create the most powerful and joint military in the world. Congress and the military Services have identified legitimate shortfalls and have initiated changes that will be implemented later this year. This article hopes to dispel some myths about the JCIDS process, evaluate the criticism and recent reform efforts, and propose additional fixes.

JCIDS exists primarily to ensure that new DoD capabilities are needed, properly scoped, and fielded in a manner that is interoperable, resilient and supportable. To determine if a program is “needed,” the process requires that the sponsor conduct a Capabilities Based Assessment (CBA) to identify and prioritize capability gaps. These gaps are informed by top-level guidance like the National Military Strategy and future warfare concepts, Combatant Command needs documented by the annual Capability Gap Assessment, and the projected threat. This mandate is spelled out in Title 10 of the U.S. Code, which also prescribes the composition of the Joint Requirements Oversight Council (JROC), which is the ultimate authority for requirement validation.

While some form of Pentagon-level requirement validation has existed since the Cold War, JCIDS was formally introduced in 2003 to standardize and manage the process for all formal DoD acquisitions. Unfortunately, the early version of JCIDS was flawed in many ways. For example, initial guidance on how to conduct a CBA was overly prescriptive and tedious, and many programs were bogged down in analysis paralysis. Furthermore, the document validation timelines were too lengthy, as many documents churned for months of reviews and meetings before getting their “day in court” at the JROC. Feedback during this period caused the JROC chairman, the then Vice Chairman of the Joint Chiefs of Staff (VCJCS) Gen. James E. Cartwright, USMC, to say of JCIDS, “We’re going to throw it away.”

The revised process, documented in the 2012 *JCIDS Manual*, reduced the CBA’s prescriptiveness and significantly cut the document review timelines. It also created a process to fast track validation of emergency requirements from the field. Other changes since 2012 enhanced system interoperability and resilience, did a better job of including the Combatant Commands during reviews, and accounted for the unique nature of information systems. While the

JCIDS process has endured many changes and improvements over the years, it is by no means perfect—as recent criticism has highlighted.

Origins of Criticisms

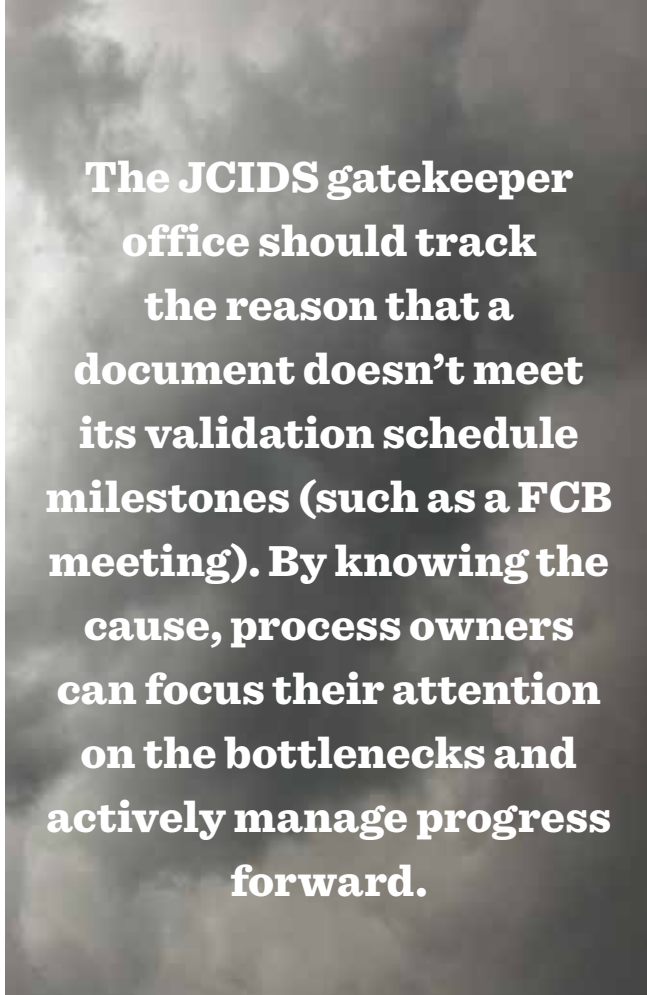
Before analyzing the criticisms of JCIDS, it is important to recognize the sources and understand the context. Prior to a formal requirements validation process, systems were envisioned, approved and procured by the military Services (e.g., Army, Navy, etc.). Departmental oversight usually didn’t become involved until the third corner of the acquisition triangle—the Planning, Programming, Budgeting and Execution (PPBE) System was engaged to provide funding. This often resulted in programs that were not joint, not interoperable and not even consistent with the overall defense strategy. Faced with these flaws, often the only option available to DoD leadership was to cut funding through the PPBE process—an “all or nothing” approach.

To help remedy this, JCIDS and its predecessor processes were created to provide a level of top-down guidance to a system that was very bottom-up. JCIDS is designed to provide a balance between bottom-up “technology push” and Service doctrine with top-down “requirements pull” and joint doctrine. Understandably, the Services have been less than enthusiastic about this shift in balance.

Much JCIDS criticism reflects an attitude that the Service always knows best and that JCIDS adds no value and should be scrapped altogether. Congress disagrees, however, and has recently changed Title 10 to improve and strengthen JCIDS. (Congress has not given the JCIDS process a “free pass,” as Miller argued—the process has been subject to multiple studies by the Government Accountability Office as well as legislative actions). Since some form of top-down requirements validation is here to stay, DoD should focus its efforts on incremental changes to improve the process.

While most criticism of JCIDS has some merit, a few assertions are flat-out wrong. For example, Miller’s claim that the “JS/JROC review adds little value. The vast majority of the documents reviewed by the JROC and subordinate boards are approved without comment.” During my experience on the Joint Staff, most of the documents I observed going through the process received significant changes based on feedback from other Services and defense agencies. Furthermore, some of the most important “value added” coming from the JROC has not come from changes to the documents but in direction provided by the approving memorandum, known as the JROCM.

For example, when evaluating an Army system that was partially redundant with an existing Air Force system, the JROC recognized the need for separate systems due to



The JCIDS gatekeeper office should track the reason that a document doesn't meet its validation schedule milestones (such as a FCB meeting). By knowing the cause, process owners can focus their attention on the bottlenecks and actively manage progress forward.

unique Army requirements, such as mobility. However, the JROC also directed that the Army and Air Force share common enabling resources, such as training ranges and tactics development. Would this efficiency and savings for the taxpayer have happened without the top-down direction provided by the JROC? Anyone who has witnessed the rivalry and mistrust between the Services in the Pentagon would think not. Moreover, regardless of changes, the process adds value by increasing joint awareness. I witnessed an example of this when the Navy validated Army assumptions regarding the number of vehicles that would fit on Navy transport ships.

Miller also asserted that the Joint Staff organization that administers JCIDS is “bloated” and that many of its people “lack the technical expertise and experience needed to fully understand the requirements in the documents.” He and other critics reference the overall Joint Staff size of 4,000 but fail to recognize that only a fraction of that number directly support JCIDS in Functional Capability Boards (FCBs) and the JROC Secretariat staff. Many have their hands full juggling two or three Service-sponsored requirements documents at any given time with Combatant Command urgent needs, all while executing the annual capability gap assessment. Unlike other pockets of the Pentagon, this cadre is largely active-duty military, as the contractor staff supporting FCBs was drastically reduced in 2015.

This ties to the other criticism that these officers, usually in the grade of O-4 or O-5 (ranging from Navy lieutenant commanders and majors in other Services to commanders and lieutenant colonels), are “not trained in the acquisition process” and thus are unqualified. It is true that most FCB Action Officers (AOs) are not acquisition professionals and receive limited acquisition training—this is how the system is supposed to work. The primary trait of the JCIDS AO, or any requirements manager, is to be an expert on the mission on which the requirements are based. The best mission experts are operators who have recently trained in the existing system or, better yet, employed that system in combat. Congress intentionally designed the JROC as a council of senior uniformed warfighters, led by the vice chairman. While top DoD civilians may participate, they do so in an advisory capacity. This is a bit of an anomaly in the Pentagon, but it makes sense that warfighter capability requirements are approved by warfighters. Of course, acquisition professionals and budget balancers eventually will get a decisive vote when it comes time to fund these requirements. Effective JCIDS leaders (the VCJCS and his lead for JCIDS, the three-star [i.e., rank of lieutenant general] Director of the Force Structure, Resources and Assessment Directorate [J8]) find a way to balance cost and performance by participating in both processes. The bottom line is that the staffs supporting the warfighter requirements processes should remain as warfighters, not acquirers.

Improvements Coming

On the other hand, many criticisms of JCIDS are indeed valid and were not sufficiently addressed by recent reforms. It is true that the three main documents currently required by JCIDS should be reduced to two. In fact, the owners of the process in J8 plan to do just that by eliminating the requirement for a Capability Production Document (CPD). The CPD had the well-intended purpose of better addressing production issues as they emerged during development and refining delivery quantities. In practice, the former issue belongs more in the acquisition, not requirement, lanes. As to the latter, delivery quantity and schedule revisions can still be adjusted through J8’s planned Capability Development Document annex.

Another valid criticism currently being addressed is the burdensome oversight from the joint community on requirements that aren’t actually joint. This is especially frustrating for Key Performance Parameters (KPPs) because they are not “tradable” unless permission is granted by the approving board, which often is the JROC. To facilitate a solution, Congress modified the Title 10 language describing JROC functions in the 2017 National Defense Authorization Act (NDAA). The language defines “joint performance requirements,” an acknowledgment that not all requirements are joint and that non-joint

requirements can be managed by the sponsor. J8 is revising the *JCIDS Manual* to implement this without impacting interoperability and awareness of Service capabilities throughout the DoD. As current VCJCS Gen. Paul J. Selva, USAF, said during a recent talk at the U.S. Army War College, this would allow the JROC to focus on only the most high-value and truly joint acquisition programs. This also will help, but not solve, the criticism that the overarching JCIDS process takes too long.

There are no good solutions to the criticism that JCIDS is too time consuming. Lt Gen Deptula, USAF, memorably said that “Al Qaeda doesn’t have a JCIDS process,” in reference to how quickly insurgents were able to create and adapt innovative asymmetric weapons such as improvised explosive devices. While that point is well taken, it is important to note that al Qaeda also doesn’t have fifth-generation stealth aircraft, a stovepiped Service-led acquisition process, and taxpayer accountability.

In my experience, the DoD 5000 series processes or technical challenges, not the requirements process, are the largest contributors to schedule slips. Furthermore, Selva has stated that 80 percent of the time spent during the requirements process is with the Services, not in the Joint Staff-led final validation.

Of the remaining 20 percent, most of the non-value-added process time was removed from JCIDS during the 2012 revision when the timeline was roughly cut in half to 97 days. Unfortunately, not all documents complete the process in the allotted time. This is difficult to fix institutionally, however, as most delays are due to issues outside the Joint Staff’s control. For example, a sponsor may take longer than allocated to adjudicate comments received during joint staffing.

More commonly, a Service may take issue with and dispute requests for changes from commenters or certification authorities. The dispute might lead to more research on system threats or a healthy debate between the Services about whether a requirement is redundant or excessive. These delays are not necessarily a bad thing—wouldn’t the DoD want to spend an extra month getting the requirement right rather than many years and millions of dollars chasing a flawed goal? To remedy this, the JCIDS gatekeeper office should track the reason that a document doesn’t meet its validation schedule milestones (such as a FCB meeting). By knowing the cause, process owners can focus their attention on the bottlenecks and actively manage progress forward.

The JCIDS process owners in J8 have periodically increased and then decreased the emphasis on tracking metrics over time. Currently, the time required for a

document to make its way from initial staffing to validation is tracked, but not much is done with the data. Increased rigor and new metrics are required to remedy this missed opportunity for process improvement and FCB accountability. Interestingly, the broader Joint Staff already successfully uses metrics to track closure of Joint Staff Action Processing (known as JSAPs) items. The home webpage for every AO is a daily update of which Joint Staff Directorates (J1, J2, J3, etc.) have completed or overdue JSAPs. The tracker is a motivator for the workforce and a point of pride (or shame) for the Directorate leadership. To implement this recommendation, metrics such as timelines, number of comments (critical/substantive/administrative), and overdue responses should be prominently displayed on every AO’s home page. Furthermore, the one-star (i.e., rank of brigadier general) JCB Secretariat should send out weekly e-mails to all JCIDS stakeholders with the current status—resulting in healthy competition among AOs. While JCIDS metrics are currently kept, they are buried in the Knowledge Management and Decision Support database and are rarely used to correct course or “nudge” the responsible party.

More Training Needed

While, as I argue above, it is incorrect to assert that JCIDS AOs have the wrong background, it is fair to state that they lack proper training. The current Defense Acquisition University computer-based training programs are helpful, but they are not sufficient. To improve AO training, J8 should offer JCIDS staffing training at least quarterly—this could be modeled off the Army’s successful Capability Developers Course. Furthermore, the first time an AO attends a FCB should not be when they are running it—some observation should be required before sponsoring a topic. Finally, the personal connections between the Joint Staff AO and the Service FCB representatives needs to be solidified earlier. To facilitate this, at least one Service FCB rep should teach a “Service considerations” lesson during the training. As each Service is different, ideally each Service would teach a lesson on how their organization implements JCIDS, who their three-star representative is and what his or her preferences are, and what major programs the Service has about to enter the process.

The JCIDS process is not perfect, but it is effective. By implementing the changes above, in addition to the changes already planned, J8 can help the DoD stay ahead of the threat in a complex environment. While some stakeholders in the process advocate scrapping JCIDS, Congress and the DoD are taking a wiser approach of incremental improvements. As the 2012 revision reduced timelines and improved cost-conciseness, these new changes can have a lasting positive impact if implemented correctly.

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Learning to Lead

Owen Gadeken

DISCOVERED THE CHALLENGE OF LEARNING TO LEAD FROM THE EARLIEST MOMENTS OF my defense acquisition career. After receiving an ROTC scholarship during my freshman year in college, I was sent to summer camp at Gunter Air Force Base in Montgomery, Alabama. It was mid-July and the heat was on outside as well as on me to show that I could learn to lead.

I didn't fare well in that first leadership challenge. I was randomly selected as flight sergeant for the first few days of summer camp and told to march my squadron of equally naive college students around the parade field. I proved amazingly inept at both marching and leading a group of marching cadets. In fact, I was so bad that I remember the tactical officer telling me, "Gadeken, you have no leadership potential whatsoever!"

When I arrived back at my ROTC Detachment, I found out that I was on probation until I could show some leadership ability. I didn't want to lose my ROTC scholarship so I looked for a role model who demonstrated the skills that I so desperately needed. I didn't have to look far because we had a standout cadet leader who

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literally exuded leadership. This was Claude M. Bolton, who went on to become an Air Force two-star general and after retiring served as the Army Acquisition Executive for 6 years.

To make a long story short, I watched Cadet Col. Bolton closely as he led the entire group of cadets and then sought to emulate his approach with my small squad of freshman cadets. It must have worked since I won honor flight of the quarter and was then taken off probation.

So, what did I learn? First, I learned that leadership is important, not just for senior military or civilians but even for the most junior people in defense acquisition. Second, the idea that leaders are born and not made is a myth. If I could learn to lead coming from a rural farming background, then anyone can be a leader who is willing to put in the work and learn the skills. Third, if you want to learn about leadership, or for that matter anything else, look for role models who already have the skills that you need and learn from them. You can watch them, talk to them and, if the timing is right, you can even ask them to be your coach or mentor.

You may think that one critical event was all I needed to chart my path to leading in defense acquisition, but that would be a mistake. The set of evolving leadership challenges I faced in my 40-year career are beyond the scope of this article. But suffice it to say, I used each one as a learning opportunity to both increase my leadership skill set and make a broader contribution to the organization and programs that I managed. And continuing the lessons learned from the paragraph above leads to the fourth key learning point. To be a leader, you must commit to becoming a lifelong learner of the art and science of leadership. There is much to be learned, so the sooner you start and the more time and effort you put in, the more accomplished leader you can become.

The Dilemma

There is one problem with this approach. Acquisition leadership training is neither highly sought after nor readily available. Military and civilians joining the acquisition workforce are confronted with a daunting set of required training in their specialty or functional area and this rarely includes leadership. In the program management career

field for example, achieving Level I certification requires from four to 10 online Defense Acquisition University (DAU) courses covering a spectrum of acquisition topics including contracting, logistics and systems engineering (but not leadership). Moving up to Level II and III certification doubles and triples the required training (again with no leadership course). Looking over these course offerings, there is a lesson or two on leadership but it is not a focus area. This same pattern is repeated in the other acquisition career fields.

The most ironic observation about acquisition career development is that leadership training is finally available in DAU 400-level courses but these come only after you achieve Level III certification in your career field. This is often 10 to 15 years after you enter the workforce. By that time, you have already had dozens of opportunities to assume leadership roles. So, the true irony is that training opportunities emerge years after you really need them.

This trend is now being reversed as DAU is developing a new suite of leadership courses that tier all the way down to entry level members of the acquisition workforce. More information will be coming out on these courses in the near future.

But let's pause for a minute. Who is really responsible for your career development including your leadership development—your organization, your supervisor, your human resources or training department, DAU...? None of these choices are correct. The real answer is you!

Your career is after all, your career. True success will come only if you step up and take personal responsibility for your career choices along with the training and development it will take to get you there.

But there are so many options. Which skills do you develop? Which courses do you take? How do you lay out a plan which will put you on the leadership fast lane?

A true roadmap for leadership development is hard to define. It depends on where you start, how far you want to go, and where you want to end up. But all is not lost. There are a few guiding principles that will make your journey easier and more likely to succeed. I will offer these guidelines in the remainder of the article.

Leadership Definition and Framework: Up, Down and Across

First, a definition of leadership. There are many definitions and they have much in common. I will offer the definition provided by Harvard Business School Professor John Kotter. Leadership entails creating a vision or strategic

direction, aligning people to follow that direction, and motivating them to achieve it.

It also is useful to have a context or framework for how leadership is practiced in organizations. I like the framework of leading up, down and across. If you have a leadership role on a team or project, your main challenge is leading down—i.e., directing the effort of those working on your team or project to achieve a goal. But leadership usually doesn't stop there. You also have to represent the work of your team or project to those above you in the organization. This involves leading up, gaining the understanding, commitment and resources from senior management to enable you and your team to work effectively. Finally, most organizations have several overlapping product and functional departments which must work together to achieve individual team or project goals. This can be the most difficult leadership of all, leading across, where you as the team or project lead must work across organizational boundaries to gain support for your team's ongoing effort. As a project manager, examples of this coordination are getting contracting, engineering, and logistics support for the project you lead.

Leading Down—Three Key Skills

Three foundational skills form the basis for all effective leadership. They are setting a strategic direction, clearly communicating that direction, and delegating and empowering your team to follow the direction and achieve the desired results. These three skills are discussed in the paragraphs that follow.

Strategic Direction

Demonstrated skill at following direction helps you qualify for a leadership position. To now succeed as a leader, you must excel at giving clear direction to your followers. Our acquisition organizations abound in vision and mission statements, values and norms, performance plans, and check lists. Much of this direction is vague, confusing and even conflicting. Your goal as a leader is to provide direction that is clear, concise and even compelling to those you lead.

One example of clear direction is the project manager who told his new team, "I want you to open up your Power Point and make a little sign for yourself that says 'Contract Award in June' and from now on anything you do that is not contributing to that goal—quit doing it—we are going to award in June."

Communication

To be a good leader, you must be a good communicator. And the most important thing you will communicate to your team is strategic direction to your ultimate goal, your plan to get there, and how will your team make it happen.

The two elements that underlie good communication are clarity and commitment. Too much of our communication is laden with lofty phrases and rambling logic. The best leaders use simple and direct statements to communicate their intent.

As important as clarity is to good communication, commitment is even more critical. As a leader, you must communicate your personal commitment to the goal you are asking your team to achieve. In many ways, the clarity of your commitment is more important than the clarity of your goal. And you communicate this commitment most clearly through your nonverbal cues: posture, facial expression, tone of voice, and body language. Your team will need to see that you are “all in” to achieve your goal before they give their commitment.

Leadership communication does not end with strategic direction. You also will face the day-to-day challenge of staying engaged with your team members, keeping them aligned toward the ultimate goal, motivating them to give the extra effort it takes to succeed, and helping them through the challenges that arise as they do their work. Key skills that contribute here are simply being available for frequent interaction, being an active listener rather than an avid talker, and providing feedback to team members to help them see the impact of their actions. Communication is a skill that can always be improved.

Delegation and Empowerment

Being a leader means that you no longer have to roll up your sleeves and do all the work. That’s why you have a team. While it is your job to point the way ahead, it will be the team’s job to do the “heavy lifting” to get there. Most new leaders find this the most difficult skill to master of all they are required to do. After all, they were selected for leadership by doing the real work themselves and now they must give this away? Yes, that’s the real dilemma of being a leader.

Effective delegation begins with the realization that you can no longer do it all. For you to succeed as a leader, you must divide the goal up into work tasks, and give these away to



your team. Your judgment and critical thinking in delegating tasks will determine your success. Each task will require someone who has the skill set (competence) to do the work and the motivation (commitment) to keep at it until the job is done. Aligning team members with tasks and stretching them to do more than they have done before or thought they could do is at the heart of effective leadership.

For delegation to be effective, it must be linked closely with empowerment. When you give a team member a major task to complete, you also will need to

give that person the responsibility, authority, resources, and accountability to get the work done. The team members can’t succeed unless you set them up properly and create the environment for them to do their jobs.

As you look back on these three key skills, it should be clear they are all interrelated. Done separately, they will be helpful but done together they will have a major impact on your success as a leader.

Related Leadership Roles

Beyond the key skills needed for leading down, there are other skills required for leading up and across. I will briefly discuss these here and perhaps elaborate on them in a future article.

Leading Up

Effectively leading up is a function of your ability to build and maintain your credibility with your organization’s senior management. The main contributors to your personal credibility are your perceived competence, openness and honesty in the eyes of your superiors. As a new leader, building your credibility with senior management is among your most important near-term goals. It takes just one misstep to lose that credibility with those above you and you may never get it back. That being said, your most important asset in establishing your credibility is how you communicate with your senior management. While you may have many opportunities to communicate down to your team, your opportunities to communicate up to your seniors are often quite limited. So, you must use these opportunities to your best advantage. This involves turning complex subjects and issues into clear and

succinct presentations to your senior leadership. This is a skill not learned overnight so start now in learning the art of presenting with clarity and confidence.

Leading Across

The other role not discussed above is leading across. This is what often differentiates the best acquisition leaders from those who still labor in the trenches. All the skills in this area are interpersonal skills. The first is relationship development. Acquisition leaders have no directive power across organizational boundaries so they must rely on the relationships they develop with others in key positions to impact their key result areas. For example, flawed relationships with budget or contracts staff can derail even the best-run technical project. The second key skill in leading across is interpersonal assessment. Beyond just developing relationships, as a leader you must understand what drives your key stakeholders to either support or oppose what you need them to do for you. And to actually get their support, you need the third key skill of strategic influence. How can you move a reluctant stakeholder to take that needed action to support you or your project? At the end of the day, effective acquisition leaders are masters of relationship development and influence.

Recommended Actions

The first recommendation in learning to lead is to assume the role of a lifelong learner. Commit to learning as much about effective leadership as you can from a variety of sources. Start with reading books on leadership. Find a favorite author and read as much of their work as you can. Everyone has favorite leadership authors. Mine are John Kotter, Brian Tracy, and Patrick Lencioni. You can also learn a lot about leadership from reading history and biographies. Two of my favorite authors here are David McCullough and Ron Chernow.

Get training. Mandatory acquisition training is light on leadership topics, but optional training is readily available. DAU along with most colleges and universities offer both online and classroom leadership courses and workshops. DAU examples are the Acquisition Leadership Workshop (WSD 019), Leading Project Teams



Acquisition leaders have no directive power across organizational boundaries so they must rely on the relationships they develop with others in key positions to impact their key result areas.

Workshop (WSD 003), Program Leadership (CLM 055), and Leading in the Acquisition Environment (ACQ 450). Work with your supervisor, mentor, and training office to take at least one leadership related course each year. Push yourself to stay current on leadership topics and tools as they emerge.

Look for opportunities to practice and apply what you learn about leadership. When you find an approach or tool that you think will work for your team, discuss it with the team members

and challenge them to try it out. Volunteer for special projects or events and offer to take a leadership role. Look for opportunities to brief your organization's senior leadership on your projects, and use these opportunities to both observe them in action and develop your communication skills.

The last and best recommendation goes all the way back to the beginning of this article. Look for role models who already have the skills you seek to develop and learn from them. Observe them in action, talk with them about their work, and ask one or two of them to coach or mentor you as you move forward with your career.

Summary

Developing your leadership skills in defense acquisition will be both a daunting challenge and an exciting adventure. Opportunities to learn and practice are everywhere. The need for leadership skills in our current environment has never been more evident. Your quest to become a leader will have great benefits for both you and the defense acquisition community you serve.

For many years, the challenge has been to develop more acquisition managers. Now the real need is to create acquisition leaders for the future. The realization is that anyone, even the youngest member of the acquisition workforce, can develop into a leader. Leading to lead is perhaps the ultimate challenge in that it's a goal that always seems just out of reach. But the reach is what we most need in the end—for leadership is a journey, not a destination!

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Auditing Contractor Goals and Objectives

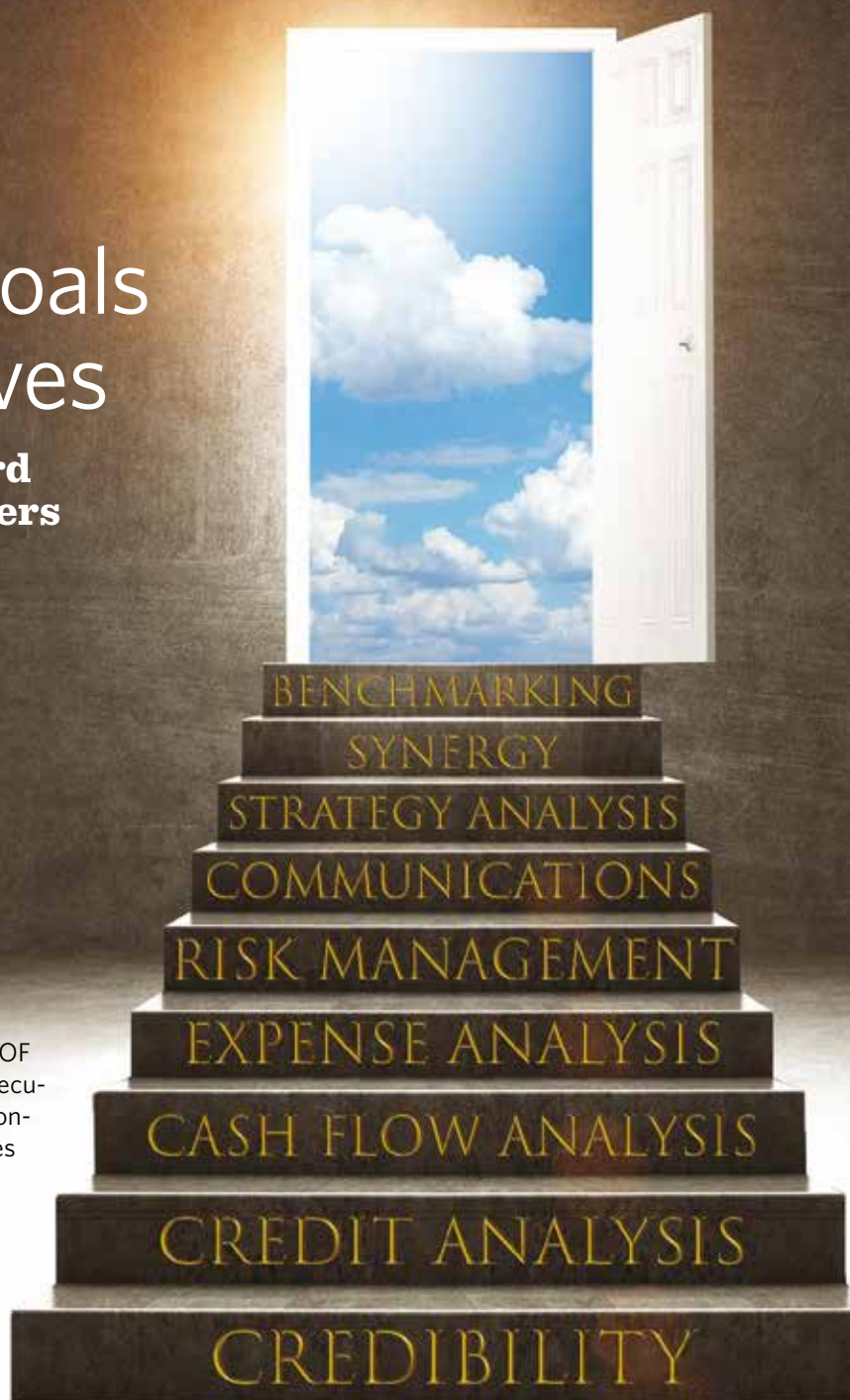
Nine Ways Forward for Program Managers

Eugene A. Razzetti

THE INTERNATIONAL ORGANIZATION OF Standards' quality, environmental, and security management standards require actionable and measurable goals and objectives for certification. Outside auditors evaluate them as part of a certification or surveillance audit. Forward-thinking managers conduct internal or self-audits to the same standards.

Disciplines, structures, techniques and checklists already exist to successfully create and monitor goals and objectives—from both inside and outside. Looking at an organization from the outside often is as helpful as looking at it from the inside. Program managers need to consider auditing of contractors to an established standard.

Directly or indirectly, program managers and outside auditors (like me) can audit both Department of Defense (DoD) program and contractor goals and objectives as part of normal program management and surveillance. Audits often uncover problems with how organizations operate in the present and, in doing so, accurately predict the future. International Standards Organization (ISO) Standards 9000, 14000 and 28000 (to name the most widely used) require viable goals and objectives in order for organizations to become ISO Certified. In doing so, they require assessment of



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the organization's ability to collect and analyze data, to identify threats and assess risks, and develop actionable corrections. They measure user feedback, the commitment of top management, and the involvement of stakeholders. In other words, everything that a program needs to create and operate successfully under a collection of actionable goals and objectives.

Many DoD program and government contractor goals and objectives are:

- Out of date or no longer appropriate
- Unrealistic (i.e., too lofty, too general, or too easy)
- Not measurable or just not measured
- Threatening or vindictive
- Ignored and/or forgotten

Nine Ways Forward

The paragraphs that follow describe nine ways to develop, revise and audit program and contractor goals and objectives.

1 Benchmarking—Where Are We?

Organizations cannot manage their goals and objectives without first benchmarking their circumstances. That is, determining and quantifying the actual performance of an operation or a process, and comparing them to expected performance. Benchmarking identifies the amount of improvement possible. Once completed, an accurate benchmarking allows program managers to assess those operations or processes on a continuing basis, in order to identify areas for improvement. Figure 2 shows the relationship between expected and actual performance. The "gap" may be strategic, tactical or operational, depending on the matter at hand. Gap analysis comes into play here, but that's a study in itself.

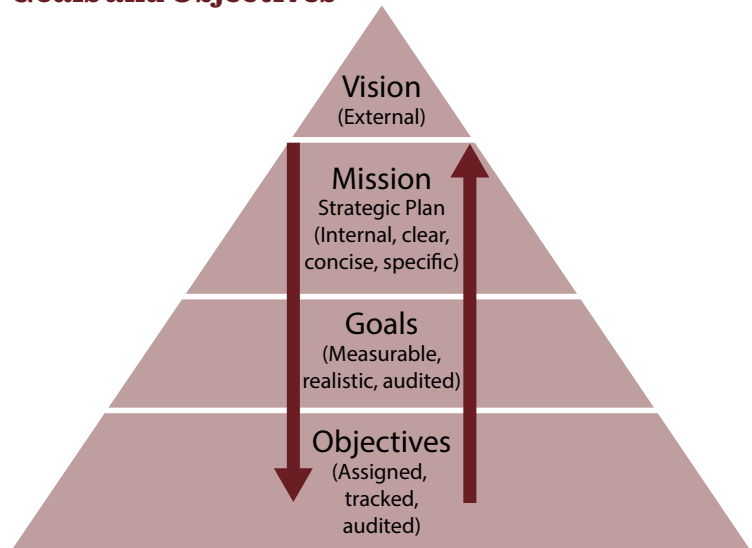
Internal benchmarking examines an organization's own activities, those taking place inside its own walls. Areas always in need of internal benchmarking include (but are not limited) to facilities, manufacturing and material handling processes, administration, training, waste, work in progress, and rejection rates.

External benchmarking can include customer satisfaction, competitors' products, recommendations from external consultants and auditors, public databases and the annual reports of other companies.

2 Synergy—Don't Leave Home Without It

Synergy can be quantified. Therefore, it can be audited. Synergy refers to the measurable behavior of whole systems not predicted by the behavior of their component

Figure 1. Auditing Program Goals and Objectives

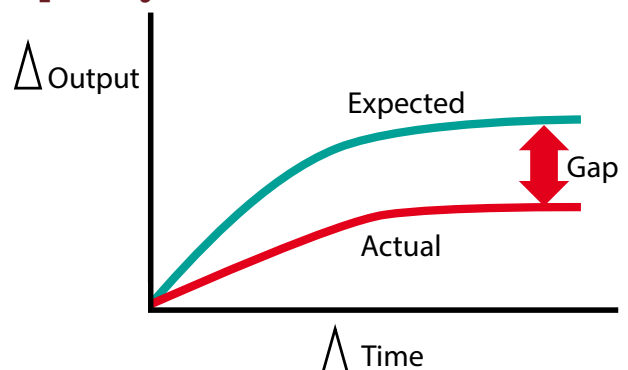


All figures by the author

parts taken separately. Synergy can play a vital role in planning and financing global business. Industry deals with how (and to what degree) to integrate capabilities and assets of diverse component organizations and how combining the capabilities can create something greater than the sum of those capabilities.

Organizations would do better by pursuing synergy, rather than innovation, because synergy can be quantified, whereas innovation (if not the result of pursuing synergy) often cannot. It follows therefore, that, if synergy can be quantified, it can be audited. What is required for the ongoing pursuit of synergies, above all, is a mindset. That is, a semi-automatic response from the program manager that says 1 plus 1 must equal 2.5 or it's not worth doing. In business, synergy can mean that, when separate departments within an organization cooperate and interact, they become more productive and efficient than they would

Figure 2. Benchmarking and Gap Analysis



be if they had operated separately. For example, it is likely more efficient for each department in an organization to deal with one purchasing department rather than for each department to maintain its own purchasing function.

Implementing synergies begins with aligning them and their associated metrics with the gaps or shortcomings discussed earlier, and for developing objectives. Properly conducted threat and risk assessments should provide the required specificity for identifying the requirements and the needed synergies, and for planning.

Redundancy → Commonality → Synergy

In the development of synergies, management must look for three progressively supporting behaviors:

- Redundancy—several organizations perform similar activities to achieve the same objectives; leading to
- Commonality—several organizations perform the same activities to achieve the same objectives; leading to
- Synergy—one organization, by performing one activity for several similar organizations, achieves more than could be accomplished by all the similar organizations each doing the same activity separately.

Too often, process improvements stop at commonality, confusing it with both innovation and synergy. Commonality is a poor substitute for either synergy or innovation.

DoD has the potential to foster a high degree of synergy. However, in terms of mission, assets and capabilities, optimization of synergy often remains elusive. It must develop or combine material assets (weapons) and nonmaterial assets (concept of operations) synergistically, in order to achieve and maintain optimal performance of systems and maximum safety, mission effectiveness, and “the most bang for the buck.”

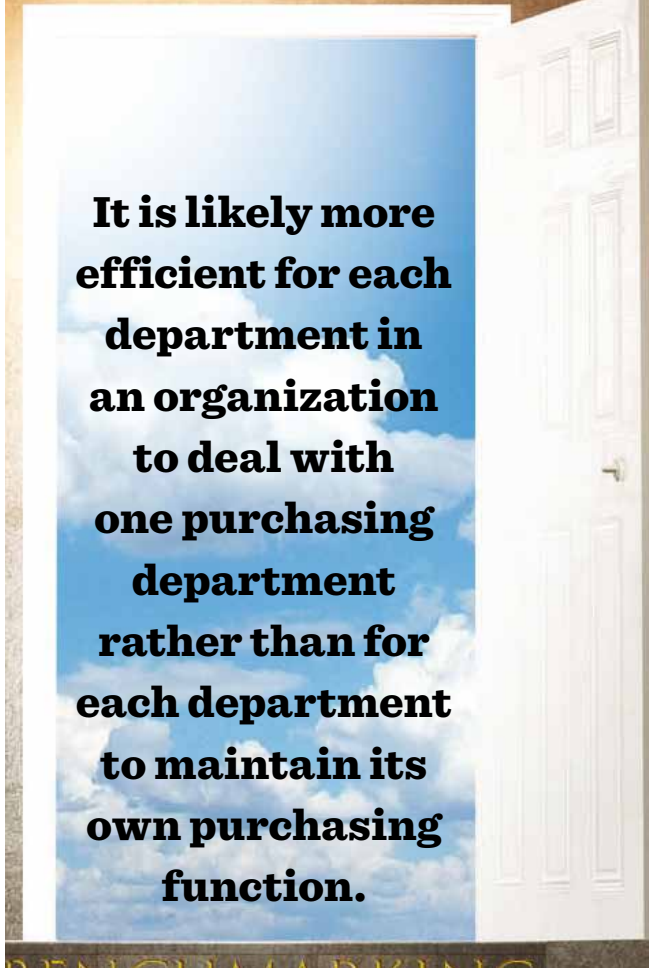
Managers and auditors must know how to look for or create synergies, how to measure their effectiveness, and how they form the basis for change and (ultimately) continuous improvement.

3 Performing Strategy Analysis

Strategy (not strategic) analysis means auditing an organization at a macro, qualitative level.

This should be considered a prerequisite to other analyses, especially as they involve financial management. Strategy analysis identifies profit drivers and risks, enabling auditors to assess the sustainability of current performance and to realistically forecast future performance. Strategy analysis looks at:

- Significant challenges in product, labor, or financial markets in which the organization operates



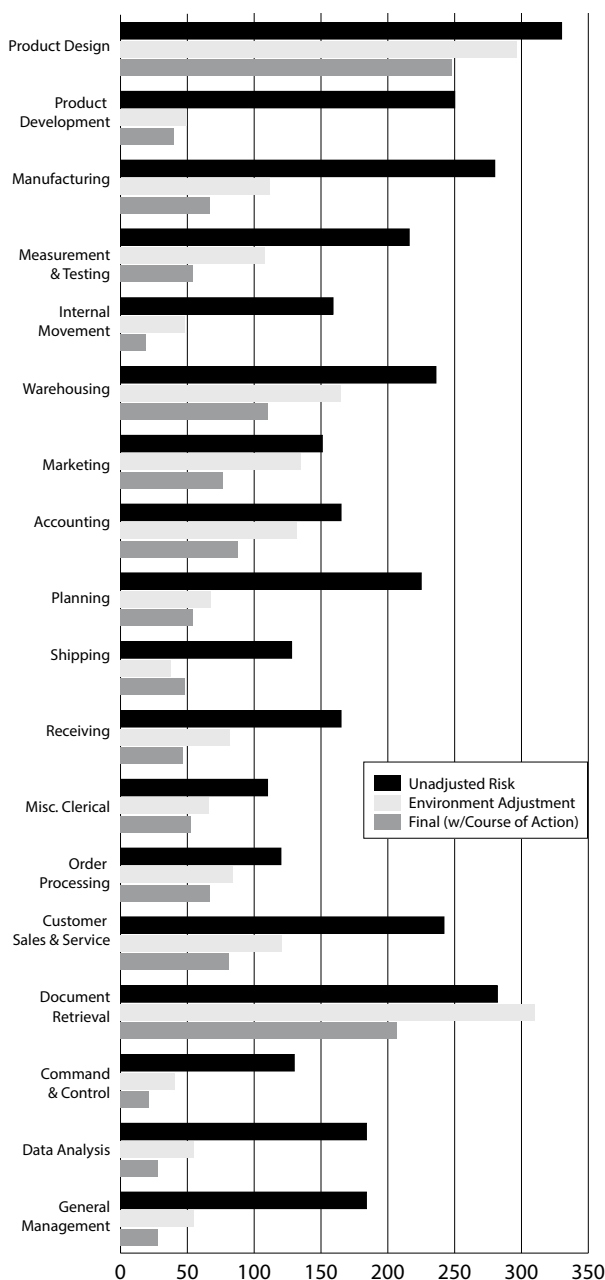
It is likely more efficient for each department in an organization to deal with one purchasing department rather than for each department to maintain its own purchasing function.

- Resources such as brand names, proprietary expertise, access to scarce distribution channels, and special organizational processes that create competitive advantage, and the “fit” of the organization’s resources with its operations (i.e., products or services)
- Organization structure for optimal decision making and/or economies of scale (e.g., centralization versus decentralization)
- The existence of internal measurement, information and incentive management systems, and whether they optimize operations and coordination
- The degree of rivalry among competitors and the ease with which new organizations can enter into the same market; plus the availability of substitute products and the power of buyers versus suppliers

4 Management’s External Communications

Like internal communication (e.g., within DoD), external communication (e.g., with investors, regulatory bodies, and the general public) should be forthright, clear, understandable, as frequent as necessary and tell the whole story. It is safe to assume that management always will have more timely and accurate information about the organization than will outside analysts. For that reason, there is always the possibility (accidental or deliberate) that an information “gap” will distort the organization’s posture or even its solvency in the eyes of current and

Figure 3. Risk Identification, Quantification and Mitigation (Notional)



potential investors. Contractors must, on a continuing basis, minimize information gaps.

Management's external communications should address any differences between internal management forecasts of future earnings and cash flows and forecasts by outside analysts, and whether any differences reflect future expectations about the future of the U.S. economy—and whether managers can credibly explain these differences. Similarly, are key business risks identified, effectively managed, and reflected in financial statements. "Unquan-

tifiable" risks (e.g., technological innovations) must be identified and examined.

Much of a financial statement is "voluntary" disclosure. Stated another way: How much information over minimum disclosure requirements do contractors provide, in order to effectively articulate their true condition, and does the organization report sufficient free cash flow to handle (as applicable) unexpected expenses, such as to repurchase shares or increase dividends, and are internal or external audit reports reflected or included?

Additionally, management can communicate with investors through meetings with financial analysts, where it can describe current performance, strategy, and outlook for the future.

5 Risk Management—Disciplined Subjectivity

Threat x Criticality x Vulnerability = Risk

Organizations that implement meaningful and effective risk management programs can control both the present and the future. However, they must be able to identify the three basic components of risk—threat, criticality and vulnerability—as they apply to their organizations. Once these three components have been identified and assigned (consistent) numerical values, management can further refine the model by "gaming" potential courses of action. It is in modeling and gaming the courses of action that Risk Assessment becomes Risk Management, as shown in Figure 3.

Computing risk, in any quantifiable, consistent, and auditable manner supports evaluating management goals and objectives because risks are identified, as well as their effects and interactions. Contingency plans and courses of action can be developed, including pre-emptive responses that mitigate or reduce potential impacts. Additionally, expected costs can be reduced, and an appropriate balance between costs and risk exposure achieved, with the goal of reduced risk exposure.

6 Expense Analysis

Expenses are produced from organizational resources that have either been consumed, declined in value, or been generated by marketing or advertising a product or service. Expenses also include salaries, depreciation, overhead, debt financing, taxes and realized/unrealized declines in asset values.

Many fixed assets are "expensed" or depreciated over a period of years. That has long been a sound practice, as long as the predicted useful life of the asset is consistent with actual usage. For example: a piece of equipment may

**Inside an organization
there are only cost
centers. The only profit
center is
the customer whose
check has not bounced.**

—Peter Drucker

be depreciated over 10 years. However, the addition of a second or third shift during the second year of operation may now have it running 24/7. Auditors look for situations like this, to ensure that expenses, as managed by the organization and as reported in financial statements accurately reflect actual situations. Anything else misrepresents the situation and damages the credibility of decisions, not to mention that of both the organization and the auditor.

Program managers can provide a valued (if not always welcomed) contribution when they ensure that contractors accurately and completely measure and analyze expenses, and then share findings with internal and external stakeholders.

Cash Flow Analysis—Where's It All Going?

Cash flow analysis examines the quality of the information shown on the organization's income statement, balance sheet, or cost proposal, and not just the quantity. Organizations normally classify their cash flows according to operations (sales of goods and services after costs); investments (capital expenditures, acquisitions, sales of long-term assets); and financing activities (cash raised from [or paid to] stockholders and debt holders).

It can reveal the strength of the cash-flow generation processes, the ability to meet short-term obligations, and the amount of money that has been invested in growth. It also can reveal whether dividends were paid, and by what means; the type of external financing the

organization relied upon; and if there was excess cash flow after making the capital investments.

It also monitors contractor business operations, growth strategy, and its financial policies. Cash-flow trends over a number of reporting periods can provide valuable information on the stability of the organization and its management.

8 Credit Analysis—Another Inside Look

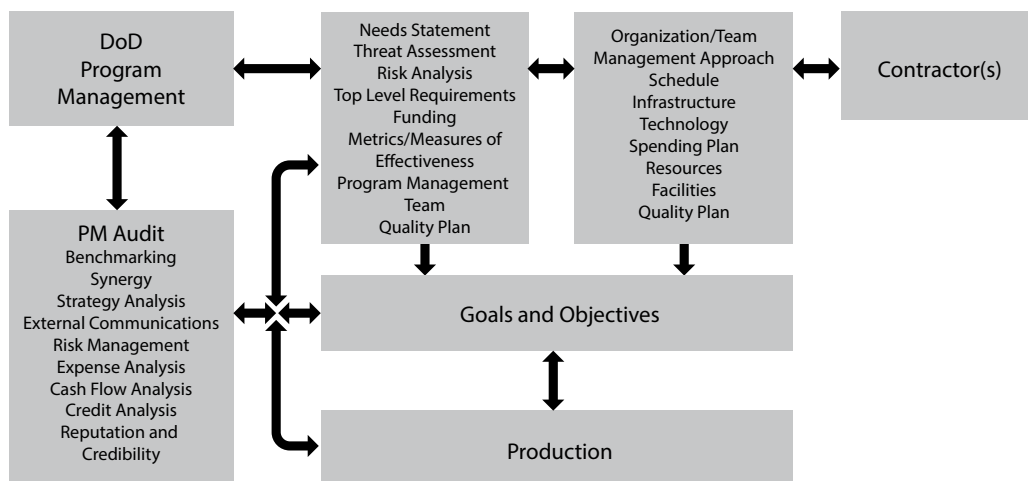
Credit analysis is another area in which auditors, who may normally focus on operations inside the organization, need to adopt the perspective of potential and current suppliers, customers, competitors, and debt holders. Arguably, credit analysis by outsiders takes place constantly, and includes such situations as potential suppliers determining whether to do business with an organization or extend credit to it, or bankers determining whether to approve loan applications.

Fund managers, brokers or individual investors must assess the soundness of an organization's securities. A raider organization will assess the viability of a merger, acquisition or hostile takeover and what constitutes fair value. Potential customers assess the efficacy of product warranties, replacement part availability, servicing, upgrades and predicted obsolescence.

Competitors routinely base their own decisions on the effectiveness of the organization in the market. Potential buyers or investors assess whether a troubled organization can be turned around, and how much time and funding a successful turnaround would require.

Performing credit analyses from the point of view of the outsider can provide DoD with excellent feedback about how contractors manage goals and objectives. Program

Figure 4. Auditable Goals and Objectives—the Big Picture



managers and contractors should realize that analysis by actual outsiders is continuous, and they need to stay ahead of it.

9 Reputation and Credibility Absolutely Essential

Auditing, as we all know, produces subjective as well as objective evidence of how an organization operates. Each quantifiable finding (i.e., each fact) obvious or hidden, simple or complicated, favorable or unfavorable, automatically generates a subjective finding as well (i.e., an opinion) and can be a cause for comfort or for concern.

A financial statement that includes questionable or misleading exhibits can, in the long run, do more damage than an accurate exhibit in which the news is not good. A trend or pattern of misleading statements in any of the areas discussed in this article is a malignancy in the organization and can be fatal.

If a contractor has a credibility problem, reports of any type or title will be viewed with skepticism, questioned and likely

disregarded. Deliberate falsifications and “creativity” can subject creators to legal as well as administrative action. At a minimum, DoD should take its money elsewhere.

Summary

Figure 4 reviews where the auditing of goals and objectives fits in the big picture of program management.

Every goal and objective must be justified by demonstrable facts—starting with the initial benchmarking. Optimally auditing of a DoD program and its associated contractors’ goals and objectives requires continual scrutiny of the many areas in which the organization performs internally and how faithfully that performance is reported externally.

As I have written previously, program managers, auditors and contractors have an ethical imperative to ensure that their credibility remains unimpeachable. To shrink from that imperative is to travel a lonely road on a very dark night.

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MDAP/MAIS Program Manager Changes

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

Army

Col. Timothy Fuller relieved **Col. James Schirmer** as project manager for Armored Fighting Vehicles (PEO GCS) on Aug. 30, 2018.

Col. Garth Winterle relieved **Col. James Ross** as project manager for Tactical Radios (PEO C3T) on July 12.

Col. Donald Burton relieved **Col. William Russel** as project manager for General Fund Enterprise Business System (PEO EIS) on July 23.

Col. Thomas Nguyen relieved **Col. Robert Collins** as project manager for Distributed Common Ground Station-Army (PEO IEW&S) on July 10.

Navy/Marine Corps

CAPT Charles W. Ehnes relieved **CAPT John C. Markowicz** as program manager for In-service Aircraft Carrier/Nimitz on July 6.

Col. Jack R. Perrin relieved **Col. Henry E. Vanderborcht** as program manager for (CH-53K) Heavy Lift (helicopter) Replacement Program (PMA 261) on July 12.

CAPT Jonathan E. Rucker relieved **RDML David A. Goggins** as program manager for Ohio Replacement (PMS 397) ballistic missile submarines on July 12.

Col. Kirk D. Mullins relieved **Lt. Col. Wendell B. Leimback** as program manager for Advanced Amphibious Assault (AAA) (PMM 201) on July 16.

Col. Devin O. Licklider relieved **Robert L. Cross** as program manager for Global Combat Support System-Marine Corps (PMW 230) on Aug. 27.

CAPT Ronald J. Rutan relieved **Ye-Ling Wang** as program manager for Gerald Ford Class Nuclear Aircraft Carrier (CVN 78) on Aug. 27.

Air Force

Col Walter A. Bustelo relieved **Col Shaun R. Hick** as program manager for Defense Enterprise Accounting and Management System Increment 1 (DEAMS Inc. 1) on Aug. 1.

Col Jennifer M. Krolkowski relieved **Col Kevin B. Massie** as program manager for Enterprise Space Battle Management on July 1.

Col Joel J. Luker relieved **Col Karl C. Schloer** as program manager for special mission aircraft HC/MC-130 Recapitalization on Aug. 1.

Col William S. Rogers relieved **Col David M. Learned** as program manager for Joint Surveillance Target Attack Radar System Recapitalization (JSTARS Recap) on July 1.

Col Jason R. Rusco relieved **Col Kevin D. Hickman** as program manager for Small Diameter Bomb Increment 2 (SDB II) on July 1.

Col Kevin B. Massie relieved **Col Daniel N. Marticello** as program manager for Presidential Aircraft Recapitalization (VC-25B) on Aug. 1.



“The significant problems we face cannot be solved at the same level of thinking we were at when we created them.”
—Albert Einstein

Interruptions From Technology

A Constant Battle to Prioritize

Diane R. Bublak

THE FEDERAL GOVERNMENT IS TASKED WITH DEVISING NEW ways to do routine tasks more effectively and efficiently. In view of constrained resources, management must do more with less. Theories about agile contracting and a variety of streamlining efforts surface in response to a reduction of regulations and statutes, such as those reported by the *Wall Street Journal* and *National Geographic* magazine. Rekindling older methods of acquiring technology, such as Other Transaction Authority/Agreement (OTA), is at the forefront of the procurement discussion.

The focus remains on getting better, getting it faster and getting it more efficiently. While the concept is great and technology has opened several opportunities to ease communication and the distribution of documents, the workforce

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feels the pressure and some cracks in the foundation begin to appear. Workforce members respond to the demands posed by constantly advancing technology by “multitasking.” Multitasking requires that a person perform multiple tasks at one time (Merriam-Webster Dictionary, 2018); it is embedded into society at all levels and includes all generations.

Multitasking could unfold as follows: An individual wakes to the sound of a smart phone or alarm. The person speaks to a home assistance device (Alexa, Google, Eco, etc.) to

a sense of a constant need to remain connected as well as to respond or react. The phenomenon is referred to as “information addiction.”

Many professional fields require that newly assigned employees enroll in and successfully complete certification courses. Most learning institutes have incorporated new technologies. For instance, wireless Internet has opened vast opportunities for online libraries, classrooms and access to a plethora of research tools and instant communication. Participants in events are tasked with prioritizing



We often reach the point of information overload or media saturation due to our constant bombardment from all sorts of media such as television, magazines, podcasts, and advertisements.

get the weather or news. The home assistant may even start the shower and coffeemaker. The person checks his or her social media (e.g. Facebook, Instagram) and responds accordingly.

Leaving for work in a vehicle, the daily commuter heads off and may talk to a smart car or phone to get traffic updates or ways around potential delays using a variety of apps (Waze, Google Maps, etc.). At the place of employment, the media overload kicks into full speed. The individual is tasked with remaining visible and active in the aforementioned social media in addition to answering personal and work phones and cell phones, personal and business e-mails, personal and business Skype accounts, and the list goes on and on.

These activities and events do not happen one after the other but instead continually interrupt and cascade on one another. The employee is consistently pushed and pulled from one task to another or into—as we call it now—multitasking. As noted in Paul Hemp’s September 2009 *Harvard Business Review* article, “Death by Information Overload,” this behavior was costing the U.S. economy \$900 billion a year—nearly a decade ago. A person must prioritize the handling of media attention grabbers.

A young “iGeneration” has been raised around constant connectivity. As new technology is introduced, the connectivity requires constant attention to an increasing number of media outlets. This generation, born beginning in the 1980s, has been exposed to technology from childhood forward. One result of being surrounded by technology is

their learning over their need to remain connected. Facilitators and participants may find the multitasking distracting. John L. Sherry, in a 2002 article in the *Communication Theory* journal, observed that facilitators and educators are working with technology and experimenting with creative methods such as blended learning, gaming, and entertainment-education to gain and hold the attention of the learners.

Once it has become a workplace routine, multitasking is amped up when the employees receive their personal identification (i.e., government Common Access Card). The cards provide access to the programs and websites necessary to perform their jobs. Use of these systems, programs, and social media sites are common methods of obtaining and disseminating information. In some cases, a person’s involvement in social media is a job requirement (many organizations now have Facebook pages, blogs, or other activity in social media).

The workplace would not be complete without technology. We are surrounded by all types of supplies and services made available by ever-changing technological advances. We find ourselves encompassed by readily available information—lots and lots of it. However, we often reach the point of information overload or media saturation due to our constant bombardment from all sorts of media such as television, magazines, podcasts, and advertisements. Federal employees face information changes with every change of administration. There are changes in laws, regulations and executive orders that change how we work. These changes are captured and disseminated to the work-

force through various methods (e.g., RSS [Really Simple Syndication] feeds, e-mail, text messages, social media, and blogs), each of which adds to the saturation.

As professionals, our reaction to attention grabbers is a key element of success. Maintaining professionalism requires self-discipline. Knowing when to remove yourself prior to saturation requires situational awareness.

So what does all of this have to do with acquisition teams and business advisors? It affects how we behave and how we conduct business. From the very beginning of our careers, we face choices and consequences. The intern taking certification courses makes a concerted effort to ignore the attention grabbers of texts and instant messages in order to enhance the learning experience. An acquisition team member may choose to be engaged in the source-selection discussion rather than checking a Facebook account or personal e-mail.

How do the distractions affect our decision-making abilities? This is a twofold question, because it encompasses both prioritization decision making. Some acquisition team decisions involve a high degree of consensus on task priorities. For example, the procurement action lead time imposes a prioritization timeline on administrative pre-award tasks, a timeline that must be met before a federal contract is awarded. However, many other decisions are not prioritized in advance, and require the professional to act spontaneously to a demand.

Decision making requires prioritization. When the priority is not previously defined, individuals generally processed more information than required, resulting in a lengthier decision-making process. Shubham Goswami wrote in the March 2015 issue of the *Journal of Management Research* that team members often face rich information but must consider the quality and quantity of the information processed when making a decision. One of the traits of a good leader is sustainable decision making, as noted just last year in the Case Management Body of Knowledge, the online resource tool of the Commission for Case Manager Certification. This requires the leader to wade through the excess information and decipher only the needed data. When team members try to complete too many tasks at once, or alternate rapidly between tasks, the error rate increases and the successful completion rate decreases. These are referred to as switching costs (See also Thomas Buser and Noemi Peter's December 2012 article in *Experimental Economics*.)

We have established that we have information overload, media saturation and technological distractions. This affects every other federal agency as well as the Department of Defense. So how do we operate more efficiently and

effectively if we are routinely pushed and pulled between tasks demanding the same brain functions (i.e., writing an e-mail or writing a contract)?

Defense acquisition teams are charged with creating competition while maintaining a competent competition pool of responsible contractors. This is done very differently today than how it was done years ago. Technology has opened the Internet and provided small businesses a gateway to service offerings that would have demanded a heavy investment in resources in the past. For example, there are data collection businesses that help acquisition teams find sources. The Small Business Administration provides useful links to various agencies that can help small business owners gain federal contracts

But all this access often can feed our media saturation or information overload. Where does the acquisition team start search? Which sites are maintained and up to date? Are any sites simply data mining to gain access to information not otherwise available through the government-wide point of entry? How much unwanted or junk e-mail will result from sharing an e-mail address? Questions like these often prevent quick decisions and online exploration for new sources in routine procurements. Quality leadership skills are key to dealing with the media saturation, information overload, and their demands throughout the workday.

Leaders know how to eliminate the unnecessary information and derive sustainable decisions in an appropriate timespan. The federal government depends on solid leaders to train, mentor and lead the way for newly assigned employees. For this reason, leaders of acquisition teams should strive to manage how they react and disseminate information to the workforce, how they react to information overload, and how they receive and process information. To do this, a good leader will require strict time management self-discipline.

Time management is an important professional trait. Stephen Covey spoke about time management in his book *Seven Habits of Highly Effective People* (1989, 2004, Free Press). Leaders understand, as Hemp noted, that organizations must ensure that their employees are not distracted by media interruptions to the point where production time is lost. The perils of multitasking are identified, but not limited to, slower response time and reduced creativity. Multitasking can add to anxious or additive behaviors, as noted by Derek Dean and Caroline Webb in their article "Recovering From Information Overload," in the January 2011 *McKinsey Quarterly*.

Managing multitasking takes skill; the media demand a majority of workers' focus. For instance, workers check e-mails 50 to 100 times per day, which equates to an average

20 hours a week just managing e-mail—and 60 percent of professional workers claim they check e-mails during restroom breaks. Hemp noted that a stunning 85 percent of surveyed employees claimed they took their work laptops home and even on vacation—so that they never take a mental break from work-related e-mails and information.

Studies have indicated that the constant interruptions of employees' work by media events can adversely affect their personal well-being as well as their ability to make decisions. Hemp explained how decision making can be delayed when an individual is unsure whether the intended party received written correspondence or questions via e-mail. Often the decision maker spends time (resources) wondering whether the e-mail was received and ignored or if it was inadvertently sent to spam or deleted. Hemp suggested turning on the "read" receipt to eliminate that uncertainty and reduce the delay in making decisions. Leaders must be aware, however, that some people are not distracted by media demands, but, on the contrary, are stimulated by the information. This leads the academic world to focus on information addiction.

Information addiction is yet another crisis caused by constant access to information. Hemp explained that an inability

to process information as quickly as it arrives can cause an employee to feel depleted and demoralized. This need to be constantly connected and processing information affects 60 percent of the U.S. population—and that is just on e-mails alone. The lines that help define a quality work-life balance become blurred when employees take their work problems home, and their home problems to work.

Focus is a key element of time management and decision making. Leaders should use available tools to help sort the data that requires attention from other data that are merely distractions. Employees focused on their jobs' current requirements need to be able to resist allowing technology such as social media to distract them from the tasks at hand. Students in certification courses or continuous learning events need to use their internal leadership skills to remain homed in on the learning event and resist media distractions. The federal acquisition team member also needs to resist the pull of media in order to plan and administer contracts and assistance awards. Sometimes, the person needs to turn off the media sources and focus exclusively on the matter at hand.

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DEFENSEACQUISITION

WRITERS' GUIDELINES IN BRIEF

Purpose

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

Submission Procedures

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

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

Deadlines

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

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

Audience

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

Style

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

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

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Length

Articles should be 1,500–2,500 words.

Format

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Graphics

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