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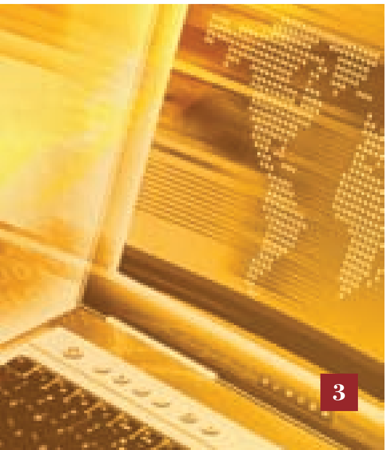

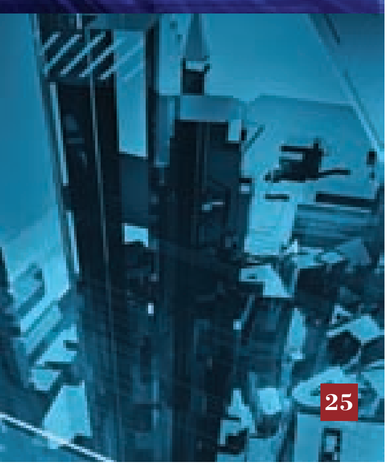

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New Directions, but Same Goal–Support the Warfighter

It's official. On March 9, 2010, Under Secretary of Defense (Acquisition, Technology and Logistics) Ashton Carter transferred the Defense Standardization Program from the Office of the Secretary of Defense (OSD) Logistics and Materiel Readiness to OSD Systems Engineering.

So why was this done and what does it mean?

The primary driver for the transfer is the Weapon Systems Acquisition Reform Act of 2009. One of the goals of the act is to revitalize and institutionalize systems engineering practices on defense programs. The act requires the OSD director of Systems Engineering to provide systems engineering principles and best practices to enhance reliability, availability, and maintainability of defense systems. To risk stating the obvious, specifications and standards are a foundation of systems engineering. They are key systems engineering process inputs to define requirements, and they are key systems engineering process outputs to establish product baselines and measure compliance. With this in mind, it became apparent, as the new OSD Systems Engineering organization took shape, that DSP had to be folded into the organization.

So what effect will this transfer have? One important effect will be to insert standardization and Diminishing Manufacturing Sources and Material Shortages (DMSMS) considerations earlier into the systems acquisition process. Both parts management and DMSMS strategies will be required in a mandatory systems engineering plan, with the goal of lowering total life-cycle costs; improving reliability, availability, and maintainability; reducing the logistics footprint; and mitigating parts obsolescence.

Another important result is a reevaluation of some of the standards decisions made under

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Acquisition Reform. In its 2008 assessment of DoD weapon programs, the Government Accountability Office concluded that the major contributor to significant program cost overruns and 21-month average delays in delivering capabilities to the warfighter was twofold: a lack of disciplined systems engineering, and a failure by the government and its contractors to understand the critical processes necessary to take a system from design to production. Although standards may not be a cure-all for these problems, one of the many virtues of standards is that they instill discipline and help eliminate uncertainty of processes, because they are based on lessons learned and what has worked well.

Don't expect a rush to judgment in the reevaluation. We plan to move thoughtfully with broad participation from the systems engineering and standardization communities, industry, and others. But if we are to recapture discipline in the systems engineering process, we will need to have the "right" nongovernment and government standards to place on contract.

The transfer of DSP to OSD Systems Engineering, however, should not be seen as a lessening of DSP's commitment to the logistics community. Ironically, since the transfer effort began several months ago, the logistics community has looked increasingly toward DSP capabilities as a solution to the materiel readiness challenges our warfighters face in Afghanistan and Iraq. We have recently met with the Defense Materiel Readiness Board—cochaired by Alan Estevez, Acting Deputy Under Secretary for Logistics and Materiel Readiness, and Lieutenant General Kathleen Gainey, Joint Staff Director for Logistics—and are exploring how DSP can better serve its needs, beginning with a pilot effort with the Joint Expeditionary Basing Working Group. In a somewhat related initiative, we have also met with representatives from Logistics Capability Portfolio Management, which seeks to provide a senior-level framework to match the combatant commanders' logistics capabilities needs with the logistics community's capabilities to meet those needs. There will be occasions when DSP's capabilities are the answer to the need.

Although DSP may be under a new organization and have some new directions, the one goal that remains the same is our commitment to better serve the needs of the warfighter. The Government Accountability Office's 2008 assessment of DoD weapon programs was fairly critical of DoD in meeting the warfighters' needs. But the report did offer some sound advice suggesting that if DoD is to deliver capabilities to the warfighter when needed and as promised, then we must have a disciplined, knowledge-based approach to achieve this end. Standards are a key element of that knowledge-based approach, and that's what we in DSP are about.

I have been able to touch only briefly on a few of the new things happening, so I encourage you to mark your calendars and plan your travel for the DMSMS and Standardization Conference on October 25–28, 2010. This conference will be your best opportunity to learn first-hand of new directions in the DMSMS and standardization communities and to meet some of the new leaders.

New Synergies between Systems Engineering and DMSMS

By Chet Bracuto, Alex Melnikow, and Ed Zelinski

Focusing on Diminishing Manufacturing Sources and Material Shortages (DMSMS) in systems engineering (SE) is a vital means of improving DMSMS risk mitigation. The Systems Engineering Directorate, within the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics, and the defense industry's SE community agree that closing the gap between DMSMS policy and practice would help ensure effective life-cycle support. Adverse impacts on weapon system availability can be reduced by applying SE principles and best practices to enhance reliability, availability, maintainability, and sustainability and by actively addressing DMSMS concerns throughout the entire life of the program.

Impacts of New Acquisition Reform Bill and Policy on Systems Engineering

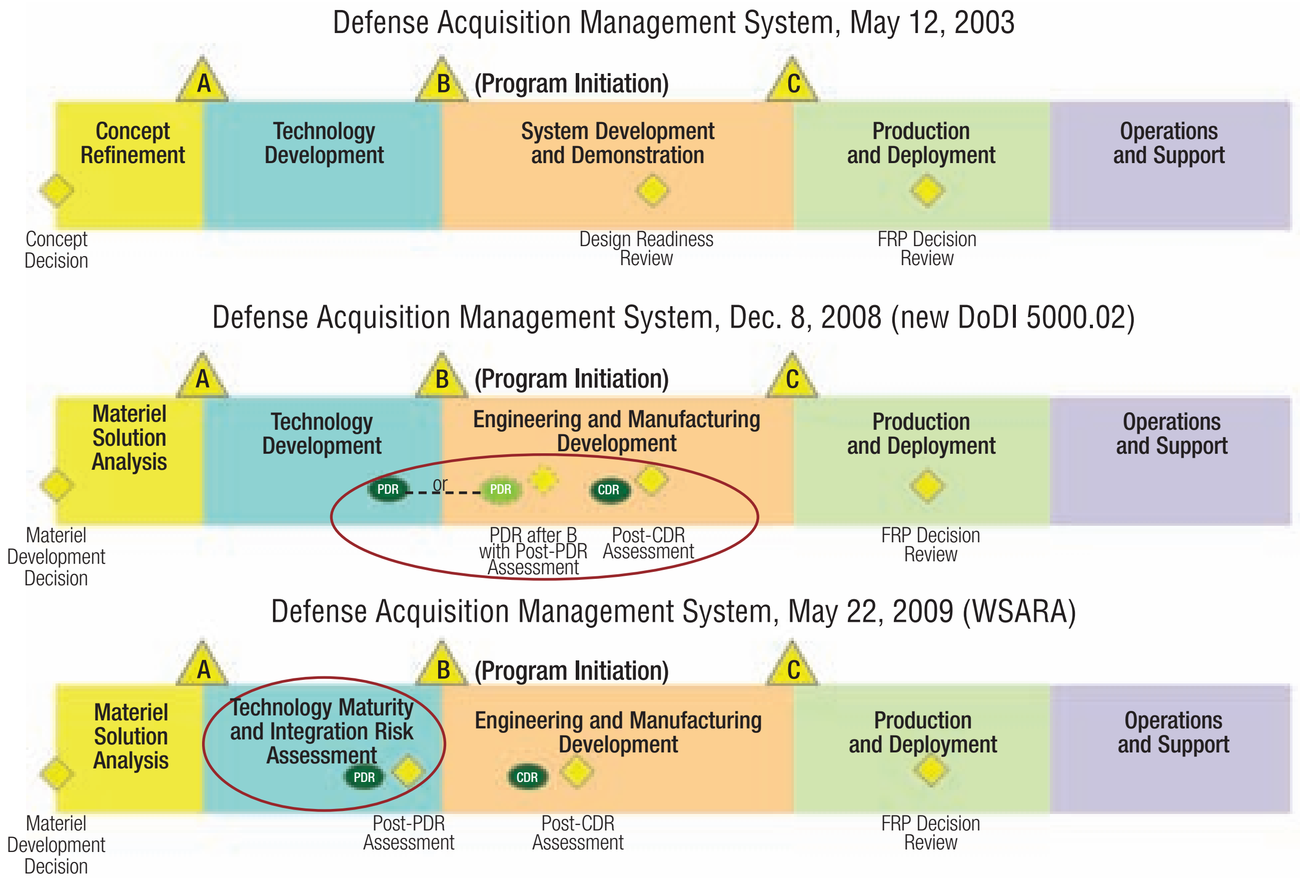
The Weapon Systems Acquisition Reform Act (WSARA) of 2009, Public Law 111-23, reformed the way Pentagon contracts and weapon systems address the cost growth and delays in acquisition. The bill, signed into public law on May 22, 2009, focuses on starting programs right by renewing the focus on SE early in a program's life cycle and strengthening DoD's developmental testing and evaluation capability in order to reduce risk. The bill reflects the position that managing major programs effectively requires sound SE, technology readiness assessments, developmental testing, and reliable independent cost estimates. In that regard, the bill establishes the position of director of Developmental Test and Evaluation (DT&E). The bill also directs the Secretary of Defense to develop and implement mechanisms to ensure that requirements for major weapon systems consider tradeoffs between cost, schedule, and performance. WSARA furthers these provisions with additional certification requirements at Milestones A and B, for mandatory competitive prototyping and with a system-level preliminary design review (PDR) before Milestone B for all major defense acquisition programs. The statute requires the completion of a PDR and a formal post-PDR assessment before a program receives Milestone B approval. Figure 1 compares the acquisition life-cycle frameworks since 2003.

WSARA requires development and tracking of measurable performance criteria as part of the systems engineering plan, test and evaluation strategy, and test and evaluation master plan. It also requires the Office of the Secretary of Defense to provide Congress an annual assessment of component capabilities for SE, development planning, and DT&E. In addition, WSARA emphasizes life-cycle management and sustainability.

Systems Engineering Goals for DMSMS

Acquisition improvements cannot be accomplished by policy and process reforms alone. They must be coupled with efficient, effective execution. Central to these

Figure 1. Comparison of Acquisition Life Cycles



Notes: CDR = critical design review, FRP = full-rate production, and PDR = preliminary design review.

improvements is a program's up-front attention to SE through parts management and DMSMS. SE design trades should allow the program to select appropriate parts and to identify potential DMSMS issues early, which will in turn enable the program to manage parts and DMSMS proactively throughout the life cycle.

DMSMS cases may occur at any phase in the acquisition life cycle, from design and development through post-production, and they may have a severe impact on weapon system sustainability and life-cycle costs. The majority of DMSMS cases have been in the electronics area (primarily microcircuits); however, DMSMS problems affect all weapon systems and material categories. In addition, DMSMS problems are not always confined to piece parts. Material obsolescence situations may occur at the part, module, component, equipment, or other system level.

DMSMS is becoming the new pervasive threat to system sustainability. To rectify this issue, the Systems Engineering Directorate established four goals to enable proactive DMSMS risk management.

GOAL 1. ENSURE THAT SE DESIGN TRADES CONSIDER DMSMS CONCERNS

Industry is developing company-wide capabilities and practices to combat DMSMS issues prior to the critical design review phase of a program. However, gaps exist between policy and practice. For example, DMSMS considerations usually are not given high priority, and design activities need early integration with DMSMS prediction/mitigation tools. In addition, proactive DMSMS methods need assessment during technical and program support reviews.

GOAL 2. REACH OUT TO PROGRAM MANAGERS AND SENIOR LEADERS REGARDING THE IMPORTANCE AND BENEFITS OF A PROACTIVE DMSMS APPROACH

DMSMS activities include engagement of both government and industry through the DMSMS Working Group. Government and industry harvest ideas through many forums such as periodic conferences. The DMSMS Working Group addresses investigations of lead-free and counterfeit electronics, cost metrics of obsolescence, and other leading-edge issues that will benefit the DMSMS community. Awareness programs, along with DMSMS training resources, are available to avoid the consequences of DMSMS. Those resources include the following:

- Defense Acquisition University (DAU) course material incorporating basic DMSMS knowledge and techniques.
- SD-22, *Diminishing Manufacturing Sources and Material Shortages: A Guidebook of Best Practices and Tools for Implementing a DMSMS Management Program*, published by DSPO in September 2009. SD-22 compiles materials from various DoD DMSMS management documents and best practices from across DoD services and agencies for managing the risk of obsolescence. SD-22 also identifies assorted measurement tools that may be useful for analyzing and tracking the effectiveness of DMSMS programs. SE and program managers should make the DMSMS guidebook their desktop reference for quickly pinpointing key actions required to manage DMSMS issues and concerns.

Outreach activities involving the DMSMS community, such as the annual DMSMS and Standardization Conference, have been successful in spreading awareness of the issue and availability of DMSMS logistics and predictive tools. Through the conference, participants should make it a priority to forge strategic partnerships between logistics and SE for long-term systems supportability for DoD weapon systems. Strong strategic partnerships at all levels within DoD, industry, and academia will enable quick response to material shortages and improve readiness and support of the warfighter.

DMSMS considerations could be better integrated into DAU courses. Leaders in the services need to provide active, consistent advocacy for DMSMS issues in programs. Investments are necessary to dramatically decrease DMSMS impacts on the warfighter. In addition, consolidation and justification of long-range DMSMS program resource requirements need to be aligned with spending priorities against defense objectives. Although reactive mitigation solutions for DMSMS will always be necessary, both DoD and industry need to move toward proactive and strategic solutions having noteworthy benefits.

GOAL 3. IMPROVE THE EARLY IDENTIFICATION AND DISSEMINATION OF POTENTIAL DMSMS ISSUES AND WARNINGS

DoD is increasingly sharing DMSMS analyses and solutions across multiple systems. Partnerships with industry have begun to pay off with common access to shared data. In addition, DoD programs are implementing international standards for end-of-life warnings in nonproprietary systems.

Legislative and environmental protection activities will increasingly restrict material availability outside the usual electronics domain. DoD and industry need to increase partnerships to share data using common standards at the part, card, and box levels in order to gain a consolidated view of inventory and demand. DoD acquisition programs need better access to shared data across services and industry. In addition, DoD and industry need to embrace measures to support the combating of counterfeit parts, the restriction of hazardous substances, and the European Union's regulations on registration, evaluation, authorization, and restriction of chemical substances. To further enhance dissemination of DMSMS issues, programs should leverage the Government-Industry Data Exchange Program for establishing standards to enable collaboration to resolve DMSMS issues. SE professionals in both DoD and industry have a clear opportunity to share knowledge regarding DMSMS issues.

GOAL 4. IMPROVE THE METHODOLOGICAL FOUNDATION OF THE DMSMS RISK MANAGEMENT PROCESS

DoD, academia, and industry need to publish documented processes to assist programs with identifying, assessing, and resolving DMSMS problems. Guidebooks should include a discussion of the potential synergy between value engineering and DMSMS. MIL-STD-3018, "Parts Management," and two DSPO documents—SD-22 and SD-19, *Parts Management Guide*—provide additional implementation details.

The DMSMS community needs to ensure tighter coupling between the SE process and the DMSMS risk management process. This connection requires more standardized techniques and the implementation of prediction and mitigation tools across a broad spectrum of government and industry to better manage obsolescence issues. Techniques to evaluate DMSMS program cost-effectiveness also are needed. DMSMS considerations should be integrated into DAU courses and into industry awareness and training programs.

Conclusion

SE's focus must be on a balanced solution that drives improvements, early in the life cycle, regarding affordability, safety, sustainment, reliability, availability, maintainability, mission performance, and system-level operational effectiveness.

With regard to sustainment, efforts need to be directed toward addressing prospective DMSMS situations during the initial phases of weapon system development or modification. This effort includes identifying current and potential DMSMS items early in the SE phase and making associated design tradeoffs to minimize life-cycle vulnerability. The foundation for effective life-cycle obsolescence management resides in careful integration of DMSMS program elements within SE activities. With a life-cycle DMSMS management program in place, SE would support cost-effective identification and resolution of DMSMS problems throughout the life cycle before they become critical situations affecting weapon system supportability and readiness. Incorporating timely and cost-effective engineering practices during all life-cycle phases will minimize the impact of DMSMS.

Acquisition reform for SE means an improved foundation of the DMSMS risk mitigation process. The transition of DSPO into the Systems Engineering Directorate will allow SE principles and best practices to enhance reliability, availability, and sustainability. Actively addressing DMSMS concerns throughout the entire life of the program will help ensure effective life-cycle support and will reduce adverse impacts on readiness or mission capability.

Note: This article is based on an expanded discussion of the presentations made by Mr. Terry J. Jaggers, Principal Deputy Director, Systems Engineering, Office of the Director, Defense Research and Engineering, and by Mr. Christian T. Orlowski, Corporate Director, Engineering and Technology, Northrop Grumman Corporation, the government and industry keynote speakers at the 2009 DMSMS and Standardization Conference.

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Counterfeit Parts Safeguards and Reporting

U.S. Government and Industry Collaboration to Combat the Threat

By Henry Livingston, Teresa Telesco, Lisa Gardner, Ric Loeslein, Ed Zelinski, and William Pumford

The importance of dependable electronic components—which drive critical communications networks, defense and space platforms, industrial transportation, financial systems, energy operations, and transportation systems, among other things—cannot be understated. Failures of vital electronic components within subsystems and systems can weaken U.S. national security and cause financial and economic disruption. The threat of failures due to counterfeit parts was a prominent subject at the recent Diminishing Manufacturing Sources and Material Shortages (DMSMS) and Standardization Conference. This article describes recent government studies concerning the counterfeit parts issue and the government-industry collaboration to combat this threat.

The Threat

The threat of counterfeit parts has been described in two key studies, one on counterfeit electronics and the other on the reliability of DoD weapon components.

STUDY ON COUNTERFEIT ELECTRONICS

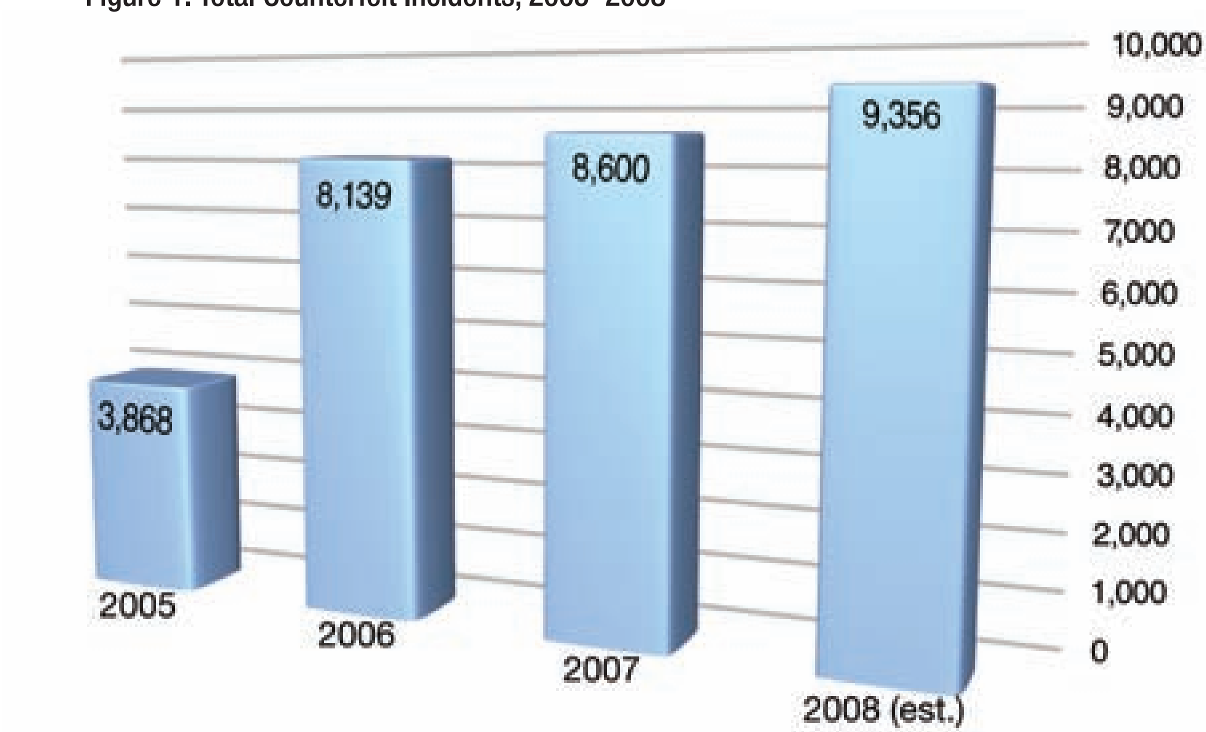
In June 2007, the Naval Air Systems Command (NAVAIR) asked the Office of Technology Evaluation (OTE)—a component of the Bureau of Industry and Security at the Department of Commerce—to conduct a defense industrial base assessment of counterfeit electronics. NAVAIR suspected that an increasing number of counterfeit and defective electronics was infiltrating the DoD supply chain and affecting weapon system reliability. NAVAIR approached OTE because of its assessment and data collection under authority delegated to the Department of Commerce under Section 705 of the Defense Production Act of 1950, as amended.

After initial discussions with the Navy and industry, OTE surveyed five segments of the U.S. supply chain: original component manufacturers, distributors and brokers, circuit board assemblers, prime contractors and subcontractors, and DoD agencies. The objectives of the survey were to assess the levels of suspected and confirmed counterfeit parts, types of devices being counterfeited, practices employed in the procurement and management of electronic parts, record keeping and reporting practices, techniques used to detect parts, and best practices employed to control the infiltration of counterfeits.

The OTE assessment focused on discrete electronic components, microcircuits, and circuit board products—key elements of electronic systems that support national security, industrial, and commercial missions and operations. A total of 387 entities, representing all five segments of the supply chain, participated in the study, which covered 2005 through 2008. The following information from this study was presented at the 2009 Aging Aircraft Conference.

Analysis of the data gathered by OTE revealed that 39 percent of the entities participating in the survey encountered counterfeit electronics during the 4-year period. Moreover, information collected highlighted an increasing number of counterfeit incidents being detected, rising from 3,868 incidents in 2005 to 9,356 incidents in 2008. (See Figure 1.) These counterfeit incidents included multiple versions of DoD qualified parts and components and consisted mostly of products that were in production rather than legacy parts that were out of production, as previously assumed. Figure 2 compares the percentage of in-production and out-of-production products involved in counterfeit incidents. The rise of counterfeit parts in the supply chain is exacerbated by demonstrated weaknesses in inventory management, procurement procedures, record keeping, reporting practices, inspection and testing protocols, and communication within and across all industry and government organizations.

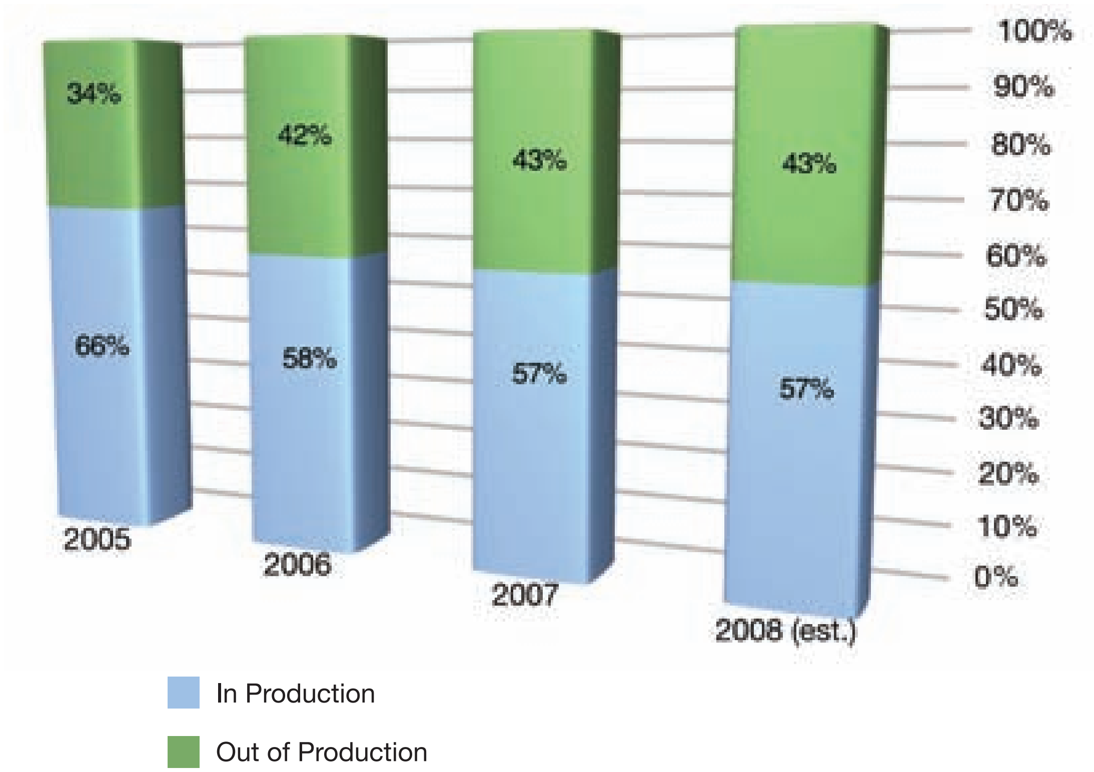
Figure 1. Total Counterfeit Incidents, 2005–2008



Source: Department of Commerce, Office of Technology Evaluation, *Counterfeit Electronics Survey*, 2009.

Note: Total includes incidents reported by original component manufacturers, distributors, board assemblers, prime contractors, and subcontractors.

Figure 2. Percentage of Counterfeit Incidents Involving In-Production and Out-of-Production Products, 2005–2008



Source: Department of Commerce, Office of Technology Evaluation, *Counterfeit Electronics Survey*, 2009.

Considering survey responses, independent research, and field interviews, OTE developed the following general findings:

- Dialogue among all organizations in the U.S. supply chain is lacking.
- The chain of accountability and record keeping within organizations is insufficient.
- The lack of traceability in the supply chain is commonplace.
- Testing protocols and quality control practices for inventories are too lax.
- Most DoD organizations do not have policies and procedures in place to prevent counterfeit parts from infiltrating their supply chain.
- All elements of the supply chain have been directly affected by counterfeit electronics.

OTE used those findings as the basis for developing a series of key best practices addressing overall business practices, part manufacturing, part procurement, receipt and storage of parts, management of counterfeits, and government activities. The final OTE report, including detailed recommendations for the U.S. government, was scheduled to be released in fall/winter 2009.

REVIEW OF DOD WEAPON COMPONENT RELIABILITY

The Government Accountability Office (GAO) is conducting a study of counterfeit parts in the DoD supply chain for the Subcommittee on Security and International Trade and Finance, part of the Senate Committee on Banking, Housing, and Urban Affairs. GAO is examining the following questions:

- What information does DoD have on the extent to which counterfeit parts have entered its supply chain?
- What processes does DoD have in place to detect and prevent counterfeit parts from entering its supply chain?
- What initiatives are underway to mitigate the risk of counterfeit parts in DoD's supply chain?

The GAO study is expected to be complete in spring 2010.

Safeguards

The globalization of aviation, space, and defense organizations and the resulting assortment of domestic and international requirements and expectations have made it challenging to ensure that products purchased from suppliers throughout the world, and at all levels within the supply chain, meet customer expectations for quality, schedule, and cost performance. To address the challenge, SAE International published AS9100, "Quality Management Systems: Requirements for Aviation, Space and Defense Organizations." The standard's purpose is to ensure customer satisfaction by having aviation, space, and defense organizations produce and improve safe, reliable products that meet or exceed customer specifications and requirements. However, no quality management process or standard of operation can absolutely avert a company's receipt or installation of a counterfeit part. Counterfeit electronic parts have been found in almost every sector of the electronics industry and continue to be an increasing threat to electronic hardware. This threat poses significant performance, reliability, and safety risks.

In response to the increasing volume of the counterfeit electronic parts entering the aviation, space, and defense organizations' supply chains, a government and defense industry collaboration identified some changes needed to combat the problem. Specifically, SAE's Counterfeit Electronic Parts Committee, formed in September 2007, developed a document that standardizes requirements, practices, and methods related to mitigating the risk of counterfeit parts. This document is suitable for multiple levels of the electronics supply chain. Representatives from industry that had first-hand knowledge of and experience with mitigating the risks associated with counterfeit electronic parts were included in this effort. The committee included representatives from the military services, Department of Homeland Security, NASA, government prime contractors, original component manufacturers, contract assembly manufacturers, franchised distributors, independent distributors, industry suppliers, and industry associations.

In April 2009, SAE released the document as AS5553, "Counterfeit Electronic Parts; Avoidance, Detection, Mitigation, and Disposition." This standard was adopted by DoD in August 2009. NASA mandates the application of AS5553 per Policy Directive NPD8730.2C, "NASA Parts Policy."

AS5553 provides solutions for addressing counterfeit parts issues across a large cross-section of the electronics industry by requiring the development and implementation of a counterfeit electronic parts control plan. The control plan should describe key processes to specifically address counterfeit part risk mitigation:

- Product traceability—methods to retain traceability of products from the original manufacturer to the end user
- Procurement—practices developed specifically to prevent the acquisition of counterfeit parts
- Risk mitigation—approaches to assess and mitigate risks of procuring parts from riskier sources
- Verification/detection—methods applied specifically to detect counterfeits
- Containment/disposition—guidelines for use when counterfeits are discovered
- Reporting—guidelines for enabling both industry and government organizations to determine whether they are similarly affected
- Component obsolescence management—guidelines addressing component obsolescence, with the goal of reducing the likelihood of having to acquire parts through riskier suppliers.

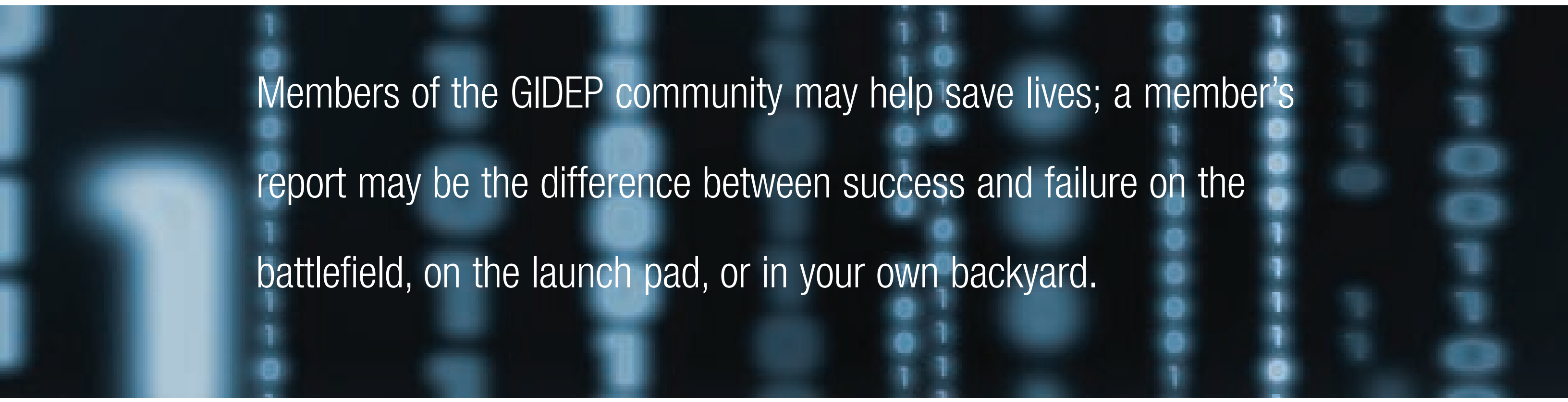
By rigorously applying AS5553, organizations assure their customers that a disciplined quality management approach is being applied to all phases of their operations and thus enabling them to mitigate the risk of counterfeit parts.

Reporting

A function of the Government-Industry Data Exchange Program (GIDEP), a part of DSPO, is to serve as a data repository for the collection and sharing of information on nonconforming parts and materials. In this role, GIDEP has seen a growth in the number of reports regarding suspected counterfeit parts. As a matter of fact, in the last 5 to 6 years, the growth has averaged 19 percent per year. Because of this increase, GIDEP is working diligently to support anti-counterfeiting efforts.

The problem of counterfeits in the government is not new. In a 1968 GIDEP alert, NASA reported surplus relays being sold as new to the government. Nor is the government faced only with challenges in the counterfeiting of electronic components. Over the years, counterfeiting of valves, breakers, and fasteners, among other things, has been reported.

Information on suspect counterfeit products is submitted to GIDEP by government organizations and industry partners. To ensure that reports are objective and fact based, GIDEP policy requires submitters to notify suppliers of their intention to report. All parties involved are allowed to present their side of the story. This process ensures that fair and accurate information is provided to the GIDEP community. To expedite the release and distribution of this critical, safety-related information, organizations that suspect counterfeits should coordinate with their internal investigative and legal organizations, and they should contact the GIDEP Operations Center to understand



what information would be useful to the community. Having this understanding will help allay the legal and investigative concerns over sharing the information. In addition, it is recommended that organizations contact the GIDEP Operations Center in advance of finding suspect counterfeits in order to establish a process to meet the potential situation. As an example of a successful industry partner, the Electronics, Intelligence, and Support group at BAE Systems has published more than 20 reports in GIDEP on suspected counterfeit items and has established a well-documented and credible process for informing the GIDEP community.

There is no charge to join GIDEP. Members of the GIDEP community may help save lives; a member's report may be the difference between success and failure on the battlefield, on the launch pad, or in your own backyard. The problem of counterfeits will not be solved by an individual; it will be solved only by the community. It will require all of us to do our part to take care of our own concerns and to watch out for others.

Entities interested in joining GIDEP should call the GIDEP Operations Center for advice and assistance with becoming a GIDEP member. The Operations Center also can help make reporting of suspect counterfeits as easy as possible. For more information, call the GIDEP Operations Center at 951-898-3207.

Stakeholders in Combating Counterfeit Parts

Combating counterfeit parts involves a wide range of disciplines: electronic design engineers, parts engineers, quality assurance engineers, buyers, auditors, inspectors, assemblers, electronic test engineers, microelectronic nondestructive test engineers, destructive test analysts, supplier managers, and so on. In short, anyone who designs, specifies, buys, receives, assembles, and tests electronic hardware is associated with the process of supporting his or her organization's goal to combat counterfeit parts.

About the Authors

The authors were panelists at the 2009 DMSMS and Standardization Conference:

- Henry Livingston is a technical director and engineering fellow at BAE Systems.
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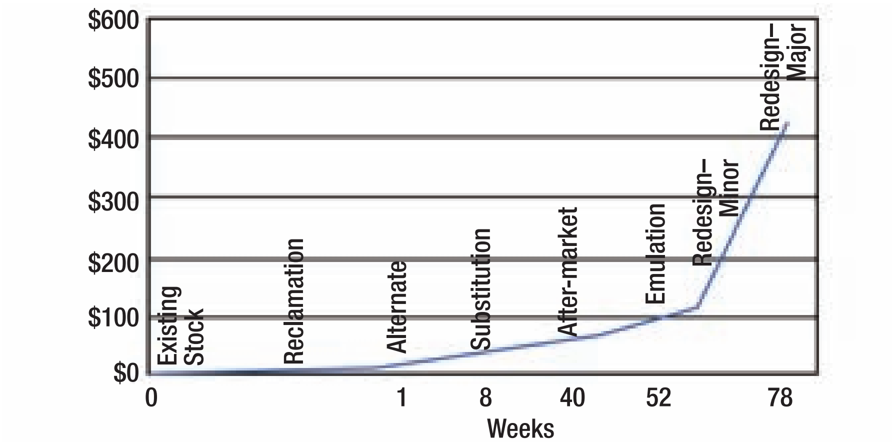
- Ed Zelinski is director of strategic operations at Northrop Grumman Corporation.
- William Pumford is DMSMS program manager, Government-Industry Data Exchange Program.

Value Engineering Solutions to Problems with Diminishing Manufacturing Sources and Material Shortages: Part 2

By Danny Reed and Jay Mandelbaum

The January/March 2009 *Defense Standardization Program Journal* contained an article describing a synergistic relationship between value engineering (VE) and Diminishing Manufacturing Sources and Material Shortages (DMSMS). It discussed similarities between the DMSMS risk management process and the VE method. The article concluded that VE is ideally suited for use in resolving DMSMS issues. Specifically, the DMSMS community identifies problems, and the VE community develops innovative solutions to those problems and also identifies funding options. Figure 1 identifies eight DMSMS solutions and shows their expected nonrecurring engineering costs and time to implement.

FIGURE 1. Cost and Time to Resolve DMSMS Problems, by Solution Type ($ thousand)



Source: Defense Standardization Program Office, *Diminishing Manufacturing Sources and Material Shortages: A Guidebook of Best Practices and Tools for Implementing a DMSMS Management Program*, SD-22, September 2009.

An article published in the July/September 2009 *Defense Standardization Program Journal* addressed the four solutions that have no or low nonrecurring engineering costs and can be implemented in 8 weeks or less. It provided some real-world examples of the existing stock, reclamation, and substitution approaches (it did not provide an example of the use of an alternate because of its similarities to the existing stock solution). This article addresses the four more costly and more time-consuming solutions: after-market, emulation (generalized here to include all reverse engineering solutions), minor redesign, and major redesign.[1] The following sections describe how VE can enhance these DMSMS resolution options and illustrate the power of VE with real examples. Examples include both value engineering proposals and value engineering change proposals (VECPs). Although some of the examples may not apply to a DMSMS problem per se, the situations are analogous. In every case, VE was used to find another way to acquire expensive, hard-to-obtain parts in the same way that DMSMS approaches look for alternative ways to acquire potentially unavailable items or materials.

VE Contributions to an After-Market Solution

A DMSMS after-market solution is one in which the original equipment manufacturer authorizes the assembly of an obsolete part. An after-market source for a product is one that uses the drawings—or technical data package (TDP) if available—and the specifications provided by the original equipment manufacturer or prime contractor to produce an after-market version of the DMSMS part.

Use of after-market sources is a viable DMSMS solution because a smaller company may undertake production that is no longer sufficiently profitable for a larger company. DoD is often able to reduce its costs by using after-market sources. With two or more suppliers, competition typically leads to lower cost. In addition, a smaller company (with lower overhead) may be able to produce an item less expensively than a larger company.

As was the case with substitute items, a drawback of this approach is that the resolution may be temporary if market conditions do not have a favorable outcome for the new source. In addition, nonrecurring engineering expenses will be incurred for building and testing the new line and for ensuring part qualification and certification to meet requirements of form, fit, and function. Finally, the unit cost may be higher.

Value engineering enables the development of viable after-market sources. Below are three examples. The first example is the development of an after-market source for the Air Force's AIM-120 Advanced Medium-Range Air-to-Air Missile (AMRAAM) Inertial Reference Unit (IRU); the IRU was developed from scratch based on the original requirements; interface constraints; form, fit, and function specifications; and help from the prime contractor.

The second example concerns making TDPs available to contractors for use in competitions for the manufacture of items that are no longer produced by the original equipment manufacturer. This concept, which is theoretical, was originally suggested by the Defense Logistics Agency (DLA), but has been updated for this article.[2]

The third example is one in which VE plays a role in identifying an after-market provider for a service. It describes a short-term solution for repairing and testing the Army's M270 rocket launcher test equipment.

1

Example of VE Contribution to an After-Market Solution:

Air Force AIM0120 AMRAAM Inertial Reference Unit

The AIM-120 AMRAAM is a fire-and-forget air-to-air missile capable of attacking beyond-visual-range targets. The AMRAAM's IRU measures vertical velocity and position, enabling in-flight steering and targeting adjustments. Originally, there was only one source for this expensive item, but the government, recognizing the value of having a second source for the IRU, included a mandatory VE program in the contract. As part of the program, the contractor provided the IRU requirements to others interested in supplying the unit and ultimately added a second IRU source through a VECP. Even though nonrecurring engineering costs totaled approximately $4 million, the VE effort initially saved $2,000 per unit. More important, without the addition of a second source, the price of the IRU probably would have increased. The potential savings cannot be accurately estimated but are likely substantial.

2

Example of VE Contribution to an After-Market Solution:

Technical Data Packages

Many original equipment manufacturers are not interested in supporting low-dollar or low-volume items after production is completed, especially when process equipment is aging and updating it cannot be justified. Typically, if a manufacturer stops producing an item, DLA must find and qualify a new source; this process is costly because of the qualification testing required to verify the new source's technical data. A considerably less costly approach is to use VE methods. If DLA were able to provide TDPs for competitive procurements and additional manufacturing sources, costs would drop considerably. DLA has observed that when contracts are competitive, the average price is reduced 47 percent. The government could use a VECP to acquire technical data rights from the contractor and use the TDP in competition. The government would then share the savings realized as a result of using the TDP with the contractor providing the data. For example, if the government realizes a 47 percent savings, the contractor may receive 20 percent of the future sales price as its share of savings on a collateral basis for a negotiated time period. To ensure that the contractor is compensated for the TDP, the VE settlement could include a 5 percent collateral share of future sales if only one company bids. In either case, DLA would not have to incur the large expense of developing and qualifying a new source.

3

Example of VE Contribution to an After-Market Solution:

Army M270 Rocket Launcher

The M270 launcher is a self-propelled armored rocket and missile-firing platform. Its Launcher-Loader Module (LLM) contains a built-in self-loading system. Each launcher has the onboard capability to receive a fire mission, determine launcher location, compute firing data, orient on the target, and fire. A fire-control solution is applied to the LLM via the Stabilization Reference Package (SRP) Position Determining System and the LLM Launcher Drive System. The DMSMS situation arose from outdated test equipment. After upgrading the SRP module, the contractor determined that the government-furnished test equipment also required upgrading, at a cost of $1.9 million. Hoping to reduce or avoid that cost, the Army conducted a VE analysis of the testing functions and found that the NATO Maintenance and Supply Agency could provide the required testing and repair of the SRP, with the exception of the gyro. The Army solved that problem by using excess gyros from decommissioned M270s. (The solution is short term because the Army is replacing the M270 with the High Mobility Artillery Rocket System.) Three-year savings for the government totaled $1.9 million.

(This example was adapted from the Army's FY06 VE award nomination for an individual.)

VE Contributions to a Reverse Engineering Solution

The reverse engineering solution seeks a producer to obtain and maintain the design, equipment, and process rights to manufacture a replacement item for which no drawings are available. In this case, the new manufacturer uses the original item to devise a method to replicate the item with sufficient fidelity to meet form, fit, function, and interface requirements. Reverse engineering discovers the design principles of the part by analyzing its structure, function, and operation. No support is provided from the original equipment manufacturer.

As was the case with substitute items, a drawback of this approach is that the resolution may be temporary if market conditions do not have a favorable outcome for the new source. In addition, nonrecurring engineering expenses will be incurred for designing, building, and testing the replacement item and ensuring part qualification and certification to meet requirements of form, fit, and function. (Reverse engineering costs can be more or less than costs incurred in trying to manufacture an item from a TDP. Often, some manufacturing subtleties are not documented in the drawings or the TDP, or the TDP could be obsolete.) The new unit cost may be higher than the original item, and there may be issues of intellectual property rights.

Value engineering function analysis identifies viable options for reverse engineering parts. The example of a reverse engineering solution is based on a real VE application that has not been finalized. Therefore, some specific details are omitted.

4

Example of VE Contribution to a Reverse Engineering Solution:
Missile

A defense missile contractor had a sole-source subcontractor for a costly warhead. The subcontractor was having problems meeting "insensitive munitions capability" requirements for the warhead to not explode if dropped or in a fire. With the cooperation of the government, the contractor submitted a VECP to develop an alternative, and less expensive, source for the warhead by reverse engineering. Developing a second source will cost approximately $12 million, but is expected to result in savings of $15,000 per warhead. Moreover, the government will likely avoid further escalation in the price of the warhead; without competition from another source, the single source has had no incentive to control costs.

VE Contributions to a Redesign Solution

As a DMSMS resolution option, modification or redesign of the item is used to either eliminate the need for the part in question or replace it with another. Redesign may occur at many levels:

- The DMSMS part itself
- The next-higher-level configuration item
- An entire subsystem
- The end item itself.

Nonrecurring engineering expenses—for building and testing the new production capability and for ensuring qualification and certification to meet requirements—increase with the scale of the redesign effort.

MINOR REDESIGN

Minor redesign treats the DMSMS problem discretely by redesigning only at the level needed to solve the immediate problem. VE function analysis identifies viable minor redesign options. Below are three examples. The first (example 5) illustrates a minor redesign for an Army Microclimate Cooling System (MCS).

Example 6 illustrates a minor redesign for the Army's Bradley fighting vehicle. The redesign involved the use of different materials. In that sense, this example could also be classified as a substitution, because one material, rather than one item, was substituted for another. (Such dual classifications are not unusual.)

The third minor redesign example (example 7) deals simultaneously with two somewhat independent parts of the Army AN/TPQ-37 Firefinder radar that were experiencing obsolescence issues. From a definitional perspective, it is sometimes hard to differentiate minor redesign from major redesign. On the one hand, this example could be construed as a major redesign because of the scope of the combined effort involved. On the other hand, each part could have been dealt with as a separate minor redesign.

5

Example of VE Contribution to a Minor Redesign Solution: Army Microclimate Cooling System

The MCS reduces heat stress to Army helicopter crewmen in chemical, biological, and hot weather environments. It features a vest worn as an undergarment beneath chemical protective clothing or other clothing. The MCS has an autonomous vapor compressor that chills water and pumps it through small tubes embedded in the vest. The Army initiated a VE study because of the high cost, unsatisfactory performance, and impending obsolescence of the analog controller for the unit. The study found that a much cheaper digital controller could be designed to perform the functions of the analog unit, while also providing valuable diagnostic information that the analog unit could not provide.

A VECP was developed to make the replacement. In addition to reducing cost, acquisition lead-time dropped from 28–32 weeks to 14–18 weeks, and the digital unit is approximately 0.19 pounds lighter than the analog controller. The government reported VE savings of $1,075 per unit. Three-year savings are estimated to be $230,000 with a potential for an additional $8 million in savings on future contracts.

(This example was adapted from the Army's FY07 VE award nomination for a contractor.)

6

Example of VE Contribution to a Minor Redesign Solution: Army Bradley Fighting Vehicle

The Bradley fighting vehicle is a fully armored, fully tracked vehicle designed to carry mechanized infantry into close contact with the enemy, to provide fire cover to dismounted troops, and to suppress enemy tanks and fighting vehicles. Operation and maintenance of the Bradley's high-performance track assembly were costly due largely to the need to replace the bushing frequently. As a result of a VE study, a VECP was developed to redesign the bushing by changing its composition to a new, more durable compound. As a result, the field service life of the Bradley's track assembly was extended, the replacement frequency was reduced, and replacement costs were avoided. Overall VE savings totaled more than $2 million.

(This example was adapted from the Army's FY06 VE award nomination for a contractor.)

7

Example of VE Contribution to a Minor Redesign Solution: Army Firefinder Radar

The AN/TPQ-37 Firefinder radar is designed for long-range detection and tracking of incoming artillery and rocket fire to determine the point of origin for counterbattery fire. The radar's legacy transmitter and radar processor were both experiencing issues with obsolescence and systemic failures. These failures hindered the radar's mission effectiveness and readiness in combat. Keeping the systems maintained required manpower and large amounts of spare parts.

The Army conducted a VE study to find alternative ways to perform the functions of the radar transmitter and processor. The study resulted in upgrading the radar with a redesigned electronic power amplifier module to replace the legacy transmitter and a redesigned radar processor. Incorporating the new components improved the system's reliability, availability, and maintainability. These improvements provide large savings in operations and support costs, which far outweigh the costs to upgrade the radar. The 3-year cost avoidance totaled nearly $103 million.

(This example was adapted from the Army's FY07 VE award nomination for a team.)

MAJOR REDESIGN

As a resolution option, major modification or redesign of the item eliminates the DMSMS issue while simultaneously dealing with much larger changes to the system. Such an effort will significantly improve performance.

VE function analysis systematically identifies economically viable opportunities for major redesign when a high degree of interdependence exists. For example, the range correlator used on the Air Force's AMRAAM represents about 15 percent of the cost of the missile. Its redesign—involving conversion from analog to digital—affected nearly every aspect of the missile.

8

Example of VE Contribution to a Major Redesign Solution:
Air Force AMRAAM Range Correlator

Early in its initial production, the basic AMRAAM used an analog range correlator. The unit was scheduled to be replaced by an enhanced digital range correlator when electronic miniaturization became more prevalent and less expensive. In the meantime, the contractor was faced with producing the missile using an analog range correlator that was very difficult to build and extremely sensitive. The contractor used VE to propose replacement of the analog range correlator with an interim digital range correlator, rather than waiting another 4 years to implement the enhanced digital range correlator, as originally scheduled. Implementation of the interim digital range correlator resulted in savings of $13,000 per unit. In total, the government saved more than $100 million, and the contractor received over $20 million in VE incentives after being reimbursed for approximately $9 million in nonrecurring engineering costs. In addition, when it developed the enhanced digital range correlator, the government was able to build on the design of the interim digital unit, generating more savings.

Conclusions

A proactive management strategy is an important aspect of minimizing the impact of DMSMS problems. Such a strategy identifies potential issues with sufficient lead-time to implement mitigating actions. The effectiveness of proactive management is enhanced with VE. This article and the two earlier articles illustrate how the robustness of the VE approach combined with cost-sharing incentives for industry can make an important contribution to determining DMSMS mitigation actions.

DMSMS organizations will need to evolve to take advantage of the synergy between VE and DMSMS mitigation. These organizations could aggressively build an internal VE competency. Basic VE training could be encouraged for key DMSMS personnel associated with program offices. This initial expertise could be sufficient to identify potential VE contributions to DMSMS situations. Once the utility of VE is established, other resources such as service VE advocates and trained VE facilitators could be made available as specific problems are analyzed. Studies could be conducted using VE tools such as function analysis, and creative brainstorming would identify a large number of options, the most promising of which would be evaluated and recommended, as appropriate.

Combining the analytical skills and subject matter expertise of the DMSMS community and other technical and managerial elements of the program with the professional problem-solving skills of the VE community creates a partnership to improve the likelihood of successfully mitigating DMSMS issues.

[1]This article was adapted from Institute for Defense Analyses Document D-3598, *A Partnership between Value Engineering and the Diminishing Manufacturing Sources and Material Shortages Community to Reduce Ownership Costs*, Jay Mandelbaum, R. Royce Kneece, and Danny L. Reed, September 2008.

[2]Office of the Under Secretary of Defense for Acquisition and Technology, *Final Report of the Process Action Team on Value Engineering Change Proposals*, July 1997.

About the Authors

Danny Reed and Jay Mandelbaum are staff members at the Institute for Defense Analyses, supporting the Office of the Secretary of Defense. Dr. Reed leads initiatives on value engineering and reduction of total ownership cost. Previously, he worked for 27 years on manufacturing development for the F-16 program at Lockheed Martin.

Dr. Mandelbaum leads technology research focusing on readiness assessment, quality assurance, and systems engineering. He spent 30 years in the federal government.

Interagency Pilot Study Evolves to Building Network-Centric Supplier Cities

By Michael Galluzzi, Ted Bujewski, and Chris Peters

The viability of the aerospace and defense industrial base suffers from the unique demands placed on it by the government. Those demands include unplanned and sporadic manufacturing or repair requirements, inconsistent hardware specifications, and technologies with a wide range of life cycles. Government demands can lead directly to decreases in profit margins, delays in product delivery, and increases in nonrecurring costs—an unattractive business model that makes it difficult for chief executive officers to justify remaining committed to their government product lines. In short, the supplier base has little incentive to maintain NASA or DoD as a customer when it can realize much greater profit margins and shareholder value in the commercial or international sector.

Industrial base management has been centered on mitigating the impacts of the basic flaws in the aerospace and defense supply chains rather than addressing the root cause—until Project STORM.

Background

Project STORM (Suppliers Transitioned and Optimized for Rapid Manufacturing) is a pilot study undertaken jointly by NASA and the DoD Manufacturing Technology (ManTech) Program, a component of the Office of the Secretary of Defense, and facilitated by DSN Innovations, Inc., a federally funded nonprofit organization established to bolster the U.S. manufacturing base. The NASA/ManTech team, which also includes Picatinny Arsenal (NJ) and the Defense Supply Center Columbus (OH), is attempting to change the dynamics of the supply chain through interagency interoperability with a common network-centric manufacturing approach using shared resources. To put it another way, the pilot study is assessing the potential interoperability between agencies and the ability to leverage each other's manufacturing supplier networks. The team believes that the burden on the U.S. manufacturing base can be reduced substantially by developing standardized processes for collaborative NASA/DoD forecast demand planning, by standardizing the agencies' hardware requirements and processes, and by allowing for better visibility of their hardware demands.

DSN Innovations has already achieved significant results with this approach in an Army project. Average results from that project include a

- 44 percent reduction in time to qualify new suppliers,
- 36 percent decrease in the effort required for suppliers to respond to an RFQ,
- 58 percent decrease in time required for supplier production setup, and
- 20 percent reduction in time between issuance of a purchase order and shipment.

Successfully addressing interoperability is the first step and will help both agencies reduce production time and recurring costs while helping to strengthen the U.S. manufacturing base. Interoperability will also ensure supplier liquidity by strategically coordinating and sharing infrastructure and maximizing capacity utilization, while minimizing process proliferation. Ultimately, this collaborative approach will utilize mass production techniques to cut costs and improve reliability for individual missions, while stimulating a dialogue among stakeholders and reducing operational complexity.

The collaborative approach will take the form of a Network-Centric Supplier City (NCSC). Because NASA and DoD have many space systems and weapons to sustain, two key question must be addressed: How many "cities" or "nodes" will be required? Will they be a virtual or a physical presence? These questions have not yet been answered, because this study is in its early stage. Supplier city nodes may be established to provide crucial links between technology inventions (and development) and industrial applications for both NASA and DoD. Ultimately, supplier cities will ensure a responsive, world-class manufacturing capability that can affordably meet the government's needs throughout systems' life cycles.

Motivation

THE NASA MOTIVATION

Due to the transition from the Space Shuttle Program to the Constellation Program, a time gap of a few years exists in NASA's operations procurement of spaceflight hardware and services. This gap represents the largest disruption to NASA's space industrial base since the Apollo Program was closed out. This disruption represents a risk not only to the successful development and deployment of the Constellation Program, but also to national security, because of the fragility of the space industrial base and its critical contribution to our national defense. Interaction with the industrial base is limited primarily to the various program elements, which, in turn, rely heavily on the prime contractor to manage its own supply chain. As a result, there is limited understanding, above and across the element levels, of the risks that the agency's supply chain poses to the cost, schedule, and safety of its programs and to the overall viability of the industrial base.

THE DOD MOTIVATION

The manufacturing and repair capacity of DoD depots and organic capabilities deteriorated rapidly due to the 1995 base realignment and closure of major depots and to the onset of the DoD reset initiative. Unfortunately, major production increases began in 2004, driven largely by the Global War on Terror (GWOT). As a result, depots have had to operate at as much as 115 percent of capacity. Past costs have exceeded $56 billion collectively across the services, and future costs are estimated at more than $25 billion for the Army, Marine Corps, and Navy, which assume 3 years to complete the reset after hostilities end. Next year's DoD GWOT supplemental budget for reconstitution requirements is unknown, but the bottom line is that DoD is actively searching for repair depot capability.

Leveraging existing capabilities of other government agencies and leveraging the collective buying power of the government is an excellent solution for matching production capabilities with shared capacity and for enhancing the support posture of various systems. Moreover, it provides the best bang for the buck for the taxpayer.

THE INDUSTRY MOTIVATION

Industry faces several challenges:

- Volatility of the industrial base and loss of critical manufacturing skills during a protracted transition or service life extension of various programs
- Potential increases in nonrecurring costs associated with lost production capability
- Need for a more agile manufacturing supplier base to better handle unexpected changes in system requirements
- Looming multibillion-dollar DoD reset program that will place a significant burden on manufacturers
- Volatile demand for aerospace and defense products.

Together, these challenges result in higher costs to industry and inefficient capacity utilization.

The Network-Centric Supplier City Concept

The NCSC is a new manufacturing business model that uses a shared physical and virtual infrastructure (hardware, software, facilities, and services) to reduce costs and that uses network-centric technologies to facilitate the smart design, rapid assembly, and seamless coordination of dynamic supply chains to accelerate production, reduce costs, and mitigate risk. NCSCs are much like traditional company-focused supplier cities created by Toyota and other large companies to reduce inventory costs and increase efficiencies. NCSCs do the same. However, an NCSC is different from the traditional supplier city in three fundamental ways:

- *Demand aggregation*. An NCSC is not driven by the purchasing volume commitments of a single, large company. Instead, the demand is aggregated from different buyers, ranging from commercial companies to government agencies. Because the demand is aggregated, the benefits of the supplier city are opened to many more buyers that may not have been able to generate enough demand on their own.

- *Infrastructure.* The NCSC infrastructure is not dedicated to a particular customer's systems. Instead, the NCSC infrastructure is a combination of technologies, standards, and processes that allow both buyers and suppliers to connect their existing systems to a common backbone. This then allows for the sharing of information throughout the supply chain, regardless of disparate software technologies. The potential impact from this type of manufacturing coordination infrastructure is significant. In addition to reducing the cost for buyers and suppliers to connect, the NCSC infrastructure opens the door for new efficiencies, which may include the following:
  - *Sourcing.* The NCSC infrastructure makes it easier to find suppliers with the right capability and capacity at the right time. This infrastructure also permits buyers to share drawings and specifications while protecting their intellectual property.
  - *Collaboration.* Once buyers are selected, the NCSC infrastructure allows buyers and suppliers to collaborate on manufacturability issues, regardless of the software used to create the drawings or models.
  - *Coordination.* The NCSC infrastructure allows participants to see the status of the manufacturing processes throughout the supply chain. This provides a new level of coordination that can help significantly reduce the costs of lack of coordination in today's supply chains.

  A key value of the NCSC infrastructure is that it allows the NCSC to extend beyond just a physical presence. Allowing suppliers and buyers to easily connect to each other extends the benefits to all organizations connected physically or virtually. More important, it enables the NCSCs to connect to each other, effectively multiplying efficiencies and opportunities.
- *Shared facilities.* Traditional supplier cities typically require suppliers to invest in buildings, equipment, and so on. The large customer behind a supplier city would sometimes contribute land or shared utilities, but most of the cost is borne by the supplier. NCSCs differ in that they typically have, at their core, buildings already equipped with advanced and expensive manufacturing equipment. These buildings are often made available to regional groups, such as economic development organizations, by large companies or government agencies that no longer need the facilities. In many cases, economic development organizations have obtained government monies to update these facilities and outfit them with new equipment. In some cases, these facilities, such as NASA's Michaud Assembly Facility in Louisiana, already have large, expensive equipment that small- to medium-size manufacturers could not afford on their own. By sharing facilities, many suppliers can capture business opportunities they might not otherwise. Whether available on a time-and-materials basis or as part of a permanent residency, suppliers can leverage this capital-intensive equipment, along with their own, to expand their offerings.

A number of entities are involved in creating an NCSC. Table 1 lists the entities and summarizes the roles they play and the value they derive from the city.

TABLE 1. Entities Involved in Creating a Supplier City

Entity	Role	Value
Supplier	Manufacture or process some component of a needed product	New business opportunities Reduced overhead costs (insurance, training, infrastructure, certifications, software, standard processes, etc.) Reduced demand volatility
Customer	Contract with supplier to produce a good	Lower cost through increased competition and reduced overhead costs Reduced risk through greater supply chain visibility and broader pool of suppliers Improved quality due to better processes and better training Reduced time for production and vendor qualification
Economic development organization (federal, state, local)	Provide shared resources to the city such as infrastructure (facilities, hardware, software, services, etc.), land, or tax incentives	More jobs Increased tax base Highly skilled work force Increased exports
Operator	Oversee the on-boarding of participants, facilitate all processes, foster interaction, and manage operations Consolidate resource benefits such as insurance and retirement plans	Revenue Growth opportunities with additional cities
University	Work with the city to research ways to improve capabilities, skills certification, and continuing education	Research grant opportunities Employment for graduates Intellectual property licensing

Project Approach

Project STORM has the following key elements:

- Launch a short-term interagency interoperability pilot project, funded by the ManTech program and supported by NASA
- Use next-generation network-centric manufacturing processes as a baseline to solve many industrial base challenges, particularly with small- to medium-size businesses
- Demonstrate the interoperability of supplier networks between NASA and DoD
- Leverage the NASA Shuttle Logistics Depot (NSLD) in Florida and the U.S. Army Armament Research, Development and Engineering Center (ARDEC) as test sites to prove the viability of interoperability

NASA Shuttle Logistics Depot

NSLD was established to assume responsibility for hardware maintenance, repair, and overhaul (MRO). The depot has earned "Star" status, the top safety classification awarded by the Occupational Safety and Health Administration; it also is ISO 9001, ISO 14001, and Aerospace Standard 9001 certified. NSLD has a 100,000-class clean room and a 160,000-class clean work area. In addition, NSLD possesses various and impressive avionics, mechanical, and testing capabilities, along with a complete infrastructure to support MRO and depot activities.

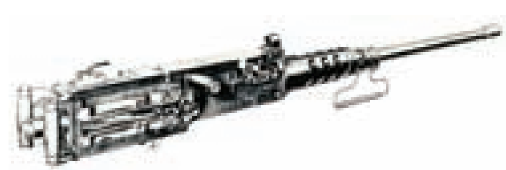
Armament Research, Development and Engineering Center

Headquartered at Picatinny, NJ, ARDEC is the Army's principal researcher, developer, and sustainer of current and future armament and munitions systems. ARDEC plays a key part in Army Transformation with its involvement in the development of the Soldier and Future Combat Systems and continued efforts in the development of advanced weapons that exploit technologies like high-power microwaves, high-energy lasers, and nanotechnology. In 2007, ARDEC became the first DoD organization in history selected to receive the prestigious Malcolm Baldrige National Quality Award, the nation's highest Presidential honor for quality and organizational performance excellence.

- Define the level of effort and cost to extend the NCSC beyond the pilot sites
- Validate the NCSC concept using two separate systems:
  - NASA—Robonaut (Figure 1)
  - DoD—M2 machine gun barrel extension. (Figure 2).

FIGURE 1.

FIGURE 2.



Once the NASA/ManTech team has validated the NCSC concept, it will establish supplier city functionality for all the internal processes.

Why NCSCs Are Important

Both NASA and DoD have a need for a healthy U.S. industrial base, low-cost manufactured goods, and expedited production cycle times. NCSCs can help meet those needs in two key ways: bolster critical suppliers and open the door for new suppliers. NASA and DoD can be great catalysts to help launch NCSCs, because these very large organizations have tremendous purchasing power.

BOLSTER CRITICAL SUPPLIERS

Manufacturers that provide critical equipment, parts, or materials are often crucial to national security. The loss of any of these suppliers results not only in significant replacement costs, it also increases the likelihood of U.S. reliance on foreign suppliers. Bringing such critical suppliers into an NCSC can yield some benefits simply through economies of scale. In addition, the NCSC can help these suppliers leverage supplier city resources to win additional business, creating a more robust and financially sound company. Perhaps most important, the NCSC can bolster critical suppliers by serving as a triage unit—helping ailing companies address the most critical issues that will keep them healthy and viable. Such triage services may range from offering manufacturing or business expertise to leveraging shared resources to reduce costs.

OPEN THE DOOR FOR NEW SUPPLIERS

The current economic crisis has made it more difficult for manufacturers to get the capital necessary to expand their existing businesses, much less start new businesses. That lack of growth, coupled with the declining manufacturing base, reduces the ability of the U.S. government to find domestic sources to manufacture critical equipment at a competitive cost. An NCSC can serve as a manufacturing "incubator" by reducing the barriers to entry for both start-up and existing manufacturers to expand into new markets and grow their business. Sharing a common infrastructure helps reduce costs, while access to industry expertise increases the likelihood of success. The result is a growing industrial base that is more globally competitive.

Although these are the more obvious means to grow new suppliers, there are subtler opportunities that may be just as powerful. Notably, NCSCs can open the door for new types of businesses. For instance, small companies that are highly competent in managing a supply chain to deliver on time and within budget will have a new set of tools at their disposal. By focusing on just the management and delivery of products—not the capital-intensive process of acquiring and assembling products—these small companies may be valuable participants in a market from which they have been excluded.

About the Authors

Michael Galluzzi, a supply chain manager, supports the NASA Exploration Systems Directorate Integration Office in Washington, DC, and the Constellation Program Office at the Johnson Space Center in Houston, TX. Mr. Galluzzi is responsible for implementing supply chain management best practices, while also ensuring a viable industrial base and product offering during the transition period of the Space Shuttle and Constellation programs.

Ted Bujewski is a senior project engineer at the Aerospace Corporation where he supports NASA in the areas of industrial base and supply chain management. Previously, Mr. Bujewski supported the DoD Executive Agent for Space as an industrial policy analyst at the National Security Space Office.

Chris Peters is the vice president of business development and special projects at DSN Innovations. He cofounded MetalSite, the world's first industry-backed online supply chain hub, and he has helped launch similar businesses in more than 20 industries. His work has been documented in several books and in publications ranging from *The Wall Street Journal* to *Business Week* and *Nikkei News*.

Program News

Topical Information on Standardization Programs

DMSMS Working Group Recognizes DMSMS Management Achievements

Diminishing Manufacturing Sources and Material Shortages (DMSMS) management (also known as obsolescence management) is critical to the sustainment of modern military and commercial systems and overall life-cycle management that enables the readiness and support of warfighters. Effective DMSMS management requires a synergistic effort by many individuals and teams across several disciplines and communities, including acquisition, parts management, standardization, logistics, and sustainment. Over the years, individuals and teams have developed numerous tools, publications, processes, policies, and procedures to mitigate DMSMS and promote proactive DMSMS management. The DoD DMSMS Working Group publicly recognizes their outstanding contributions and achievements through annual awards.

The 2009 awards, presented at the 2009 DMSMS and Standardization Conference, included a lifetime achievement award, an individual achievement award, eight team achievement awards, and two special recognition awards. The criteria for the 2009 awards were fivefold: exceptional DMSMS management of a weapon system, significant improvement in quantifiable readiness levels, substantial cost avoidance, exceptional warfighter support related to or realized through a DMSMS issue, and creation or implementation of a DMSMS best practice demonstrating high positive impact on the warfighter.

Congratulations to this year's winners!

Lifetime Achievement Award

Jack McDermott, a retired long-time employee of ARINC Engineering Services, LLC, received the Lifetime Achievement Award for his two decades of leadership in helping agencies affected by obsolescence to collaborate. Mr. McDermott was collecting DMSMS cost data before the cost metrics report was started and was developing DMSMS plans before guidance was issued. He has focused on one goal: collaborate to help minimize the impact of DMSMS on the warfighter. He was also recognized for helping to establish and then cochairing the DoD DMSMS Teaming Group. Known as a pioneer in proactive DMSMS management, Mr. McDermott has probably saved the taxpayer millions of dollars by sharing common solutions, at a time when every program was developing its own unique solution.

Pictured above are, left to right, Mr. Larry Stone, Mr. John "Jack" McDermott, and Mr. Walter Tomczykowski.

Individual Achievement Award

Pictured above are, left to right, Mr. Alex Melnikow, Mr. Tony Hartling, and Mr. Gregory Saunders.

Tony Hartling, of BAE Systems, has worked for more than 7 years supporting Hill Air Force Base's DMSMS initiatives. His position as an on-site program manager, his experience and knowledge, and his unique attention to detail have made him an invaluable asset in meeting the DMSMS needs of the Space and Command, Control, Communication and Intelligence (C3I) program. To date, the Space and C3I team has loaded data and documentation—1,236 technical orders, 8,014 drawings, and 106,683 pages—on 59 systems into BAE's AVCOM database. The team has also loaded information on 45 systems into Applications, Programs, Indentures, increasing the number of valid records by 408,946 lines, and it has submitted 11,228 errata to correct technical orders. Through his work, Mr. Hartling has achieved an overall cost avoidance of $426 million.

Team Achievement Awards

Pictured above are, left to right, Mr. Alex Melnikow, Mr. James Bainbridge, Ms. Wendy Wilcox, Ms. Janalie Brown, Mr. Louis Wendzel, Mr. Bob Boehm, and Mr. Gregory Saunders. Team members not pictured are Mr. Geoff Hale, Mr. John Meyer, Ms. Jodie Mitchell, Mr. Jerry Scribner, and Mr. Russ Smith.

The **Air Force Intercontinental Ballistic Missile Prime Integration (IPIC) Team**, led by Northrop Grumman and including individuals from the government and BAE Systems, takes a forward-looking management approach to DMSMS issues affecting the Minuteman III. As a result, this critical weapon system, although aging, has a nearly 100 percent average alert rate; continues to command an essential role in deterrence; and contributes substantially to making the force highly reliable, consistently available, and practical to maintain. Strategic management of DMSMS issues supports the Team's vision: keep America free and strong by providing safe and secure Minuteman IIIs that are a reliable, accurate, and highly survivable component of America's nuclear arsenal.

Pictured above are, left to right, Mr. Alex Melnikow, Mr. Joseph Corbin, Mr. Gene Schaeffer, Mr. Thomas Sanneman, Mr. Dan Shaver, Mr. Willie Brown, Ms. Michelle Kelly, Mr. Gary Coe, Ms. Alicia Janszen, Mr. Michael Greber, Mr. Vester Adams, and Mr. Gregory Saunders. Team members not pictured are Mr. Kent Hammitt and Mr. Armand Roux.

The **Air Force Joint Primary Aircraft Training System (JPATS) T-6 DMSMS Team** established the first nose-to-tail total aircraft concept for combating DMSMS. This approach catalogs and monitors all electronic and non-electronic components to the piece-part level for the aircraft, aircrew training devices, and support equipment. Bringing parts suppliers into DMSMS management has been a key element to the program's success. The team—comprising individuals from the government, Hawker Beechcraft Corporation, BAE Systems, and L-3 Vertex—has mapped DMSMS management processes, developed a business case analysis tool, established cost avoidance metrics, and created a JPATS DMSMS web portal. As a result of the team's efforts, no aircraft have been grounded and no production line work has stopped due to DMSMS. This program will be central to the sustainment of the 767 JPATS aircraft and 103 aircrew training devices.

Pictured above are, left to right, Mr. Alex Melnikow, Mr. Edward Kitchen, Mr. Bill DeBusk, Ms. Deborah Patterson, and Mr. Gregory Saunders. Team members not pictured are Mr. Vaughn Hook, Mr. William Jacchia, Mr. Mark Krysinel, Mr. Angel Lopez, Ms. Linda Luevano, Mr. Mike Nichols, and Mr. David Ponsell.

The **Air Force Joint Surveillance Target Attack Radar System (Joint STARS) Total System Support Responsibility Program Team** proactively implements hundreds of solutions for managing obsolescence, enabling Joint STARS to maintain superior mission effectiveness. The team also led the effort to establish proactive methods for managing obsolescence for both commercial off-the-shelf and aircraft assemblies. The process is enhanced by the team's web-based customer-accessible DMSMS management tool. This diverse Northrop Grumman team supports several Air Force organizations and multiple subcontractors.

Team Achievement Awards

Pictured above are, left to right, Mr. Alex Melnikow, Mr. Tony Asbell, Mr. John Alcorn, Ms. Becky Arnold, Ms. Lynne Marinello, Ms. Josie Woody, Mr. Brian Cabelli, and Mr. Gregory Saunders. Team members not pictured are Mr. Neale Bruchman, Mr. Al Hopkins, Dr. Wayne Hudry, Ms. Brooke Nix, Mr. Morgan Stanley, and Ms. Tabitha Stebbins.

The **Army Apache Obsolescence Working Group** supports the Army Apache performance-based logistics program. The team, with key members from the Apache Program Office, the Army Research, Development and Engineering Command Engineering Directorate, and Boeing Mesa, has a single goal: life-cycle management. From contracts and logistics to support and production engineering, the team has successfully implemented standardized information-sharing and problem-solving processes, capitalized on funding opportunities, and executed an obsolescence program that has documented $100 million in redesign cost avoidance to date.

Pictured above are, left to right, Mr. Alex Melnikow, Mr. David Robinson, Ms. Marcia Scott, Mr. Dwayne Jones, Ms. Jennie Williams, Mr. Chuck Marshall, and Mr. Gregory Saunders. Team members not pictured are Mr. Charles Besore, Mr. Mitch Canty, Mr. Loan Chu, Mr. Alan Clark, Mr. Jeffrey Feick, and Mr. Robert Peyton.

The **Defense Logistics Agency Defense Supply Center Columbus DMSMS Team** has achieved many successes working with numerous DoD and international DMSMS teams and, through that work, has contributed significantly to the development of innovative DMSMS management techniques. Among other activities, the team resolves interoperability and international logistics problems, develops and provides DMSMS training, manages and resolves DMSMS cases, performs life-of-type buys, and researches components. Through the Generalized Emulation of Microcircuits (GEM) and Advanced Microcircuit Emulation (AME) programs, the team provides continuing microcircuit solutions. Annually, the team processes 500 cases, reviews 50,000 national stock numbers (NSNs), purchases $5 million in discontinued parts, and generates cost avoidances exceeding $80 million.

Team Achievement Awards

Pictured above are, left to right, Mr. Alex Melnikow, Mr. William Johnson, Mr. David Robinson, Mr. Mark Lester, Ms. Justine Corboy, Mr. Allan Schlier, Ms. Hoa Vo, Mr. Milton Diaz, Ms. Renee Marshall, and Mr. Gregory Saunders. Team members not pictured are Dr. Leslie Avery, Mr. Thomas Beckstedt, Ms. Donna Davis, Mr. Harvey Hanson, Mr. Theodore V. Lenthe, Mr. John J. Niemiec, and Mr. Robert Sinagra.

The **Defense Logistics Agency Microcircuit Emulation Team**—with members from Sarnoff Corporation, Defense Supply Center Columbus, and SPAWAR Systems Center Pacific—identifies microcircuits that are no longer manufactured commercially but are still needed by the military to meet weapon system life-cycle requirements. Candidate microcircuits are emulated; the emulated microcircuits are form, fit, function, and interface equivalents to the original device and comply fully with the original quality requirements. Emulated microcircuits are stocked in the same supply bins as the originals and require no separate testing by the end users. Once a microcircuit has been emulated, it is permanently available through the GEM or AME program. These programs are credited with avoiding more than $500 million in next-higher-assembly redesign costs.

Pictured above are, left to right, Mr. Dave Martin, Ms. Danielle Knipp, Mr. Greg Jaknunas, Mr. Brian Landers, Mr. Kevin Hearn, Mr. Jon Tirpak, Ms. Karron Small, and Mr. David Koel. Team members not pictured are Mr. Chris Bergner, Mr. Keith Doubleday, Mr. Daniel Gearing, Mr. Walker George, Mr. Matt Hutchens, Mr. Dean Hutchins, Mr. Don Joseph, Ms. Vicki Knauf, Mr. Dwayne Porter, Dr. Ragu Ragunathan, Mr. Thomas Schulte, and Dr. Mark Vonderembse.

The **Defense Logistics Agency National Forging Tooling Database (NFTD) Team**, led by the Forging Defense Manufacturing Consortium, created the NFTD to locate and leverage millions of dollars of federal investment in forging dies for DMSMS solutions. All too often, procurement of legacy parts with forgings is delayed by the inability to locate forging dies rapidly. The NFTD team solved that problem. The NFTD, which is readily available through IHS's HAYSTACK® Gold, can rapidly locate forging dies, all over North America, needed to produce critical parts for DoD. The NFTD represents 280,000 NSNs or part numbers valued at $5 billion in forging dies. The database minimizes administrative lead-time in locating forging dies and sources and reduces production lead-time and costs, thus contributing to the reduction in back orders.

Team Achievement Awards

Pictured above are, left to right, Mr. Alex Melnikow, Mr. Greg Salo, Ms. Lindsey Womeldorf, Mr. Kristopher Axtman, Mr. Doug Winder, and Mr. Gregory Saunders. Team members not pictured are Mr. William Broillard, Mr. Joseph Hanchinamani, Mr. Richard Jaramillo, Mr. Ron Kelleigh, Mr. Mikel Mairs, Ms. Kendra Pang, and Mr. Ed Rohrbaugh.

The **Navy *Virginia*-Class Submarine Technology Refresh Team** works to resolve obsolescence issues caused by commercial off-the-shelf electronics at the circuit card/module level or at the piece-part level. Through its proactive approach and teaming process with the prime contractor, Electric Boat, and its use of the Obsolescence Management Information System, the team avoids unplanned and costly redesigns by recommending optimum obsolescence mitigation plans to the *Virginia*-class program office. Since program inception in 2001, the team has provided solutions for more than 650 electronics obsolescence issues that directly affected the operational capability, safety, and reliability of almost every major system on the ship. The team's solutions resulted in more than $84.4 million in cost avoidance and $8.87 million in cost deferral.

SPECIAL RECOGNITION AWARDS

Pictured above are, left to right, Mr. Alex Melnikow, Mr. Henry Livingston, and Mr. Gregory Saunders.

Henry Livingston, an engineering fellow and technical director at BAE Systems, has been a leader in the detection, mitigation, and reporting of counterfeit parts affecting both government and industry. In addition to publishing Government-Industry Data Exchange Program Alerts, he has published papers discussing the counterfeit parts problem and sharing information from investigative findings. He also has presented at numerous national industry-wide seminars, conferences, and workshops. In addition, Mr. Livingston was a major contributor to and promoter of SAE Aerospace Standard AS5553, "Counterfeit Electronic Parts; Avoidance, Detection, Mitigation, and Disposition"; much of the material on procurement practices, counterfeit detection, disposition, and reporting is based on policies and practices applied within BAE Systems.

Pictured above are, left to right, Mr. Alex Melnikow, Ms. Teresa Telesco, Mr. Kevin Kurland, and Mr. Gregory Saunders. Team members not pictured are Mr. Brad Botwin, Mr. Mark Crawford, and Mr. Christopher Nelson.

The **Counterfeit Electronics Assessment Team** is the focal point at the Department of Commerce's Bureau of Industry and Security for analyzing the financial and production capabilities of the U.S. industrial base to support national defense. At the request of the Naval Air Systems Command, the team conducted surveys and assessed the impact of counterfeit electronic parts and components on the U.S. defense supply chain. The results of the team's efforts led to a groundbreaking study highlighting the infiltration of counterfeit electronics throughout the U.S. supply chain. The study also cataloged best practices used in the supply chain to avoid counterfeit electronics, and it recommended actions that the government could take to inhibit the circulation of counterfeit electronics.

Events

Upcoming Events and Information

April 20–22, 2010, McLean, VA

PSMC Spring Conference

The Parts Standardization and Management Committee (PSMC), chartered by DSPO, will hold its spring conference at LMI in McLean, VA (Washington, DC, metropolitan area). Please note that attendance is open only to PSMC participants. If you are involved in some aspect of parts management and are interested in being a first-time participant, please contact Donna McMurry at Donna.McMurry@dla.mil or call 703-767-6874.

PLEASE NOTE DATE CHANGE:
May 12, 2010, Chantilly, VA

QPD Users Group

DSPO will be hosting a 1-day Qualified Products Database (QPD) Users Group in the Washington, DC, area. DoD and General Services Administration personnel who enter data into the QPD are encouraged to attend. Even if you have already had QPD training, you may want to attend the May gathering, because we will be reviewing the latest QPD enhancements, such as validation, stop-ship function, and PDF capability. This session will also provide a forum for database users from different organizations to discuss QPD issues and lessons learned, as well as to suggest ideas for possible enhancements. Please contact Donna McMurry at 703-767-6874 or Donna.McMurry@dla.mil for details.

September 23, 2010, Washington, DC

2010 World Standards Day

The U.S. Celebration of World Standards Day will take place at the U.S. Chamber of Commerce in Washington, DC. This year's theme is "Standards through Accessibility." For more information about the 2010 World Standards Day celebration, exhibition, reception, and dinner, please go to http://www.wsd-us.org.

October 25–28, 2010, Las Vegas, NV

DMSMS and Standardization 2010 Conference

Mark your calendars now and plan to attend the 2010 Diminishing Manufacturing Sources and Material Shortages (DMSMS) and Standardization Conference at the Rio All-Suite Hotel in Las Vegas, NV. Once again, the conference will include multiple tracks of topics, including one featuring topics relating to the Defense Standardization Program and another on the Government-Industry Data Exchange Program. As the conference planning develops, key information will be posted on the DMSMS and Standardization 2010 website. For more information, go to www.DMSMS2010.com.

People

People in the Standardization Community

Farewell

Luis Garcia-Baco, Army Departmental Standardization Officer (DepSO), retired on February 3, 2010. Until a permanent replacement is selected, the acting Army DepSO will be James Whalen, Director (acting), Industrial Capabilities Directorate, Headquarters, Army Materiel Command–Forward (Redstone Arsenal, Huntsville, AL).

Passings

Jay Kratz, supervisor of the standardization section in the Engineering Support Branch at the Defense Supply Center Philadelphia–Aviation Detachment (Standardization Management Activity) passed away on November 4, 2009. A metallurgical engineer, Mr. Kratz attained his master's degree in engineering from the Colorado School of Mines in 1963 and his master's degree in business from Drexel University in 1968. Mr. Kratz began serving as the supervisor of the standardization section in 2001, bringing with him more than 10 years of experience working in the Defense Standardization Program and another 28 years of experience at Westinghouse Corporation. He is missed by his colleagues. Memories of his kind and competent demeanor remain.

Norman Kimmel, DepSO at the Defense Logistics Agency (DLA) during the 1980s, passed away on February 15, 2010. Mr. Kimmel began his career in 1946 in the Electronic Supply Office at Naval Station Great Lakes in Waukegan, IL. In 1962, Mr. Kimmel moved to the Defense Electronic Supply Center in Dayton, OH, where he worked until 1975. He was then transferred to DLA's Cameron Station, in Alexandria, VA, where he worked until he retired in January 1992. He served the government for 46 years.

Defense Parts Management Portal—DPMP

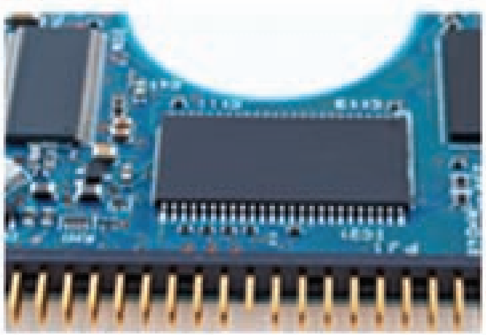
The DPMP is a new public website brought to you by the Parts Standardization and Management Committee (PSMC) to serve the defense parts management community.

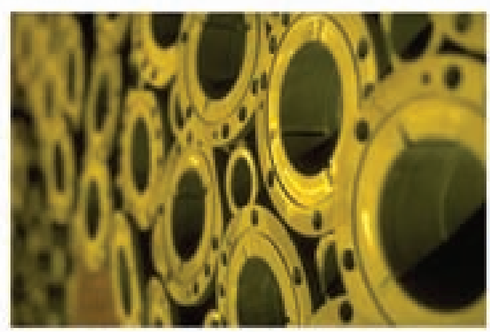
The DPMP is a new resource, a new marketplace, and a "one-stop shop" for parts management resources. It is a navigation tool, a communication and collaboration resource, and an information exchange. It gives you quick and easy access to the resources you need, saves you time and money, connects you to new customers or suppliers, and assists you with finding the answers you need.

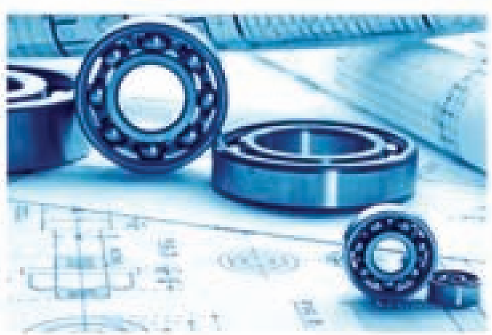
This dynamic website will grow and be shaped by its member organizations. A new and innovative feature of the DPMP is its use of "bridge pages." Organizations with interests in parts and components are invited to become DPMP members by taking control of a bridge page. Chances are good that your organization is already listed in the DPMP.

There is no cost.

Explore the DPMP at https://dpmp.lmi.org. For more information, look at the documents under "Learn more about the DPMP." Click "Contact Us" to send us your questions or comments.







Upcoming Issues
Call for Contributors

We are always seeking articles that relate to our themes or other standardization topics. We invite anyone involved in standardization—government employees, military personnel, industry leaders, members of academia, and others—to submit proposed articles for use in the *DSP Journal*. Please let us know if you would like to contribute.

Following are our themes for upcoming issues:

Issue	Theme
April/June 2010	2009 Standardization Stars
July/September 2010	Systems Engineering
October/December 2010	Science and Technology

If you have ideas for articles or want more information, contact Tim Koczanski, Editor, *DSP Journal*, Defense Standardization Program Office, 8725 John J. Kingman Road, STP 5100, Fort Belvoir, VA 22060-6220 or e-mail DSP-Editor@dla.mil.

Our office reserves the right to modify or reject any submission as deemed appropriate. We will be glad to send out our editorial guidelines and work with any author to get his or her material shaped into an article.


DEFENSE STANDARDIZATION PROGRAM
MAKING SYSTEMS WORK TOGETHER