Defense Standardization Program

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FORCEnet

Naval Aviation Critical Safety Items

Industry-Managed QPL Program

Defense Standardization Program Journal

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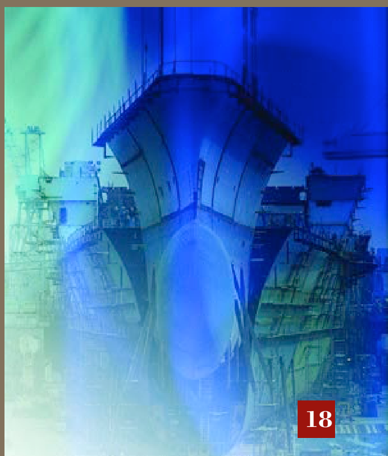

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In the last issue of the *Defense Standardization Program Journal*, I alluded to the fact that I would soon be welcoming the Navy Standardization Executive to this column to introduce an issue devoted entirely to the standardization efforts and initiatives of the Navy. In the future, I will afford the Air Force the same opportunity as we continue in-depth looks into the standardization activities of the services. But for this issue, it is my pleasure to turn over my column to Nicholas Kunesh, the Navy Standardization Executive. As was the case with the Army standardization issue (January–March 2004), this issue is filled with many of the standardization efforts and initiatives that the Navy is currently working on. Please enjoy reading about the good work being done by the Navy and see how some of its standardization successes might apply to you.

Gregory E. Saunders
Director, Defense Standardization Program Office

Message from the Navy Standardization Executive

By Nicholas Kunesh
Navy Standardization Executive and Deputy Assistant Secretary of the Navy (Logistics)

The Navy and Marine Corps have defined our respective strategies in Sea Power 21 and Marine Corps Strategy 21. These overarching documents define the Department of the Navy framework for organizing, aligning, integrating, and transforming to a fully networked naval force to meet the challenges and risks that lie ahead. Navy Sea Power 21 focuses on the need to project precise, effects-based, and persistent offensive power (Sea Strike) while providing global defensive assurance to protect the unit, fleet, homeland, joint forces, and allies ashore (Sea Shield). The foundation for offensive and defensive capabilities is our ability to preposition, disperse, and freely maneuver warfighting assets afloat (Sea Basing). The glue that binds and integrates all the necessary information, intelligence, sensors, communications, decision aids, and other critical operations to make Sea Strike, Sea Shield, and Sea Basing fully networked is known as FORCEnet.

To convert concepts into practice, Sea Power 21 establishes a mandate for ensuring that our sailors are better educated, better trained, better equipped, better employed, and better integrated (Sea Warrior). It establishes a process for fleet experimentation of new concepts and technologies to provide a constant stream of innovative solutions more frequently and faster (Sea Trial). Sea Power 21 established direction

Nicholas Kunesh
Navy Standardization Executive

for the Navy to sustain core business capabilities but to do so with improved organizational alignment, fleet focus, enhanced process efficiencies, and optimized investments such that savings can be used to enhance warfighter effectiveness (Sea Enterprise).

Marine Corps Strategy 21 similarly establishes four transformation pillars. These are ensuring organizational agility, developing and applying new maneuverable and joint operational concepts, exploiting leap-ahead technology, and reforming business operations.

The central theme of Sea Power 21 and Marine Corps Strategy 21 is ensuring that all operational, business, engineering, and support elements across the Department of the Navy are aligned to the same objectives, and that they are flexible in execution, and that they are efficient in action. To meet the strategy objectives, Navy standardization needs to meet the intent of these strategies. We must be organizationally aligned with fleet requirements. Our job is to meet or exceed fleet expectations. And to meet these expectations along priorities established by the fleet, we must be able to adapt to changing requirements and priorities in the time frame required by the fleet, and to do all this as efficiently as practical. As the Navy Standardization Executive for the past year, I would like to offer my perspective on some of the initiatives associated with Sea Enterprise and what's required of standardization to meet expectations.

To move Navy acquisition and logistics processes toward more efficient and effective business practices, we have begun employing plans to institutionalize several modern efficiency methods that eliminate non-productive practices. The "theory of constraints" is a standardized approach to identifying and alleviating obstacles within a system that limit ability to make significant advances toward objectives. The theory relates complex systems to a chain, where the weakest link restricts the overall capability of the chain. To continuously strengthen a chain, one needs to identify the weakest link, stress it to its maximum capacity but not beyond, subordinate the other links to the limits of the weak one until the link is replaced or enhanced, and then start all over. To make significant improvement in a complex process, the greatest must be identified. The constraint must be exploited to its maximum capacity. Other processes dependent on the constraint must be subordinated so that products are not held in queue and resources are not misapplied while the constraint is broken down. When the constraint is elevated such that it is no longer the weakest link, the cycle starts anew.

We are applying "lean" methods to relentlessly eliminate waste, whether in inventory, production and repair, or other operations. Lean applies techniques such as value-stream mapping to understand all steps in a process flow of material or information to determine those that add value and those that do not. Lean applies six-sigma techniques to reduce process variability, rework, and defects. Lean principles help identify unbalanced lines, excessive movements, and extensive wait times. The outcomes of these initiatives are reduced cost of operations, improved quality, and shortened time from "I need it" to "I got it."

The Navy's systems commands are actively engaged in a variety of initiatives to apply modern tools and techniques to improve operations. As two examples, the Naval Air Systems Command has embarked on Project AIRSpeed to achieve "Cost-Wise Aircraft Readiness" by applying lean tools, the theory of constraints, and six-sigma practices across the naval aviation enterprise. The Naval Sea Systems Command initiated a theory of constraints project management method, called Critical Chain Project Management, to all naval shipyards in its "One Shipyard" initiative. Both initiatives focus on reducing costs, increasing throughput, and providing better responsiveness to fleet requirements.

I can't think of a time when standardization should be more revered. Our systems and equipment today are expected to be born interoperable. Joint and coalition operations are now the norm rather than the exception. Everyone is working to reduce the logistics footprint. All services are concentrating on enhancing current and future readiness. Standardization should be viewed as the fundamental "blocking and tackling" of transformation. Yet somehow standardization is often viewed as a constraint to other processes rather than an enabler. Transformation places a premium on speed, agility, responsiveness, quality, and affordability. When one looks at these key process characteristics, current standardization processes often fall short.

Rather than look at the glass as half empty, I see great opportunities to eliminate internal constraints in standardization processes. But to truly improve, we must be willing to challenge what we do today, why we do it, and the way we do it. We cannot tinker around the edges. It is not sufficient to automate an inefficient manual operation. The operation must be reengineered using techniques described above, as well as others. Our evaluation must be critical, thorough, and not self-serving. We must be willing to make hard decisions on organizations, established ways of doing things, and the need for non-value-added processes (or products). We must apply technology solutions where they enhance speed, cost, and quality. We must be careful, however, about believing that technology is the solution in itself. Technology can help and is often necessary to improve, but it is seldom sufficient without other forms of reengineering.

I firmly believe standardization is an essential tool for engineers, operators, logisticians, manufacturers, maintenance personnel, regulators, and contracting officers. Specifications and standards define what is expected and the means to verify performance. They minimize variation and variability. If done properly, specifications and standards reflect best current practices and allow for technology growth. They facilitate interoperability and interchangeability. They ensure safety.

The question is not how to make standardization relevant, but how to make standardization efficient, timely, responsive, and affordable. The focus must be on minimizing administrative burdens (constraints) that impinge on getting standardized technical solutions into the hands of those that need them. The technical requirements must foster standardization objectives while facilitating design and manufacturing innovation, cost-effectiveness, technology insertion, and best industry practices. Transformation is a process of continuous improvement. We need to constantly focus on better ways to achieve standardization effectiveness with the greatest possible efficiency. We will be revisiting standardization practices and processes within the Department of the Navy to identify areas for significant improvement. I encourage standardization leaders throughout DoD to do likewise.

Navy Standardization Initiatives in Support of Sea Power 21

By Jeff Allan

"It was the best of times, it was the worst of times." Although Charles Dickens was referring to the French Revolution, he could very well have been discussing standardization over the past decade. We've seen a shift from specifying product details toward increased reliance on defining performance outcomes. We've seen the pendulum swing from reliance on military specifications and standards to aversion to "Mil-Specs" and back to recognition that good specifications—whether published by the private sector or the Department of Defense—are essential. We've seen policy simultaneously requiring waivers to use military specifications and waivers not to use specifications. We've seen collaboration between the military and nongovernmental standards bodies at unprecedented levels. The past 10 years have been quite a ride, but a necessary and ultimately beneficial one. Although traumatic, it is essential to periodically challenge practices to ensure that they remain relevant, effective, and efficient.

The Navy's operating strategy for the 21st century has likewise been redefined. Sea Power 21 establishes the goal of a fully integrated, networked, ready, and technologically capable naval force. Joint and coalition military operations will be the norm in our century. Interoperability between and among systems, equipment, and forces is essential. The Navy's acquisition and logistics practices must support the strategy: they need to be lean, they need to be agile, and they must be affordable.

Sea Power 21 establishes the goal of a fully integrated, networked, ready, and technologically capable naval force.

The articles contained in this edition of the Defense Standardization Program Journal describe some of the ongoing Navy standardization initiatives that will make Sea Power 21 a reality. I encourage you to read them.

Mike Stewart (Space and Naval Warfare Systems Command, or SPAWAR) describes FORCEnet. FORCEnet is the technology that enables the seamless flow of information across sensors, platforms, weapons, networks, and forces. Conrad Dungca (SPAWAR) describes the challenges and successes in establishing modeling and simulation standards and methodologies.

With respect to ship design, maintenance, and repair, Matthew Milas (Altarum Institute) describes the costs, risks, and benefits of commodity standardization at shipyards. Ron Nason (Naval Inventory Control Point) discusses initiatives to facilitate standardization of Hull, Mechanical, and Electrical (HM&E) repair parts. Keith Doyne and Dan Martinez (both from Naval Sea Logistics Center) present the HM&E Equipment Data Research System to estimate logistics costs of introducing new HM&E components.

On the aviation side, John Fischer (Air Force Aeronautical Systems Center) and Mary Zidzik (Naval Air Systems Command, or NAVAIR) provide the background, structure, and status of a series of performance-based Joint Service Specification Guides for aviation systems and subsystems. Jim Zidzik and John Stoneham (both from NAVAIR) discuss the innovations in automating and integrating discrepancy reporting across the naval aviation maintenance universe. Ed Auger (NAVAIR) and Tom Broadhurst (Sverdrup Technology) describe the background and recent policy initiatives ensuring the quality of aviation critical safety items.

Brad Secrest (Naval Surface Warfare Center) explains successes in standardizing military-unique batteries. Tom O'Mara (NAVAIR) presents the need for and progress in creating an industry-based qualification program acceptable to DoD. Finally, Connie White (Naval Inventory Control Point) outlines the background and automation tools of the Defense Logistics Information System.

Standardization and interoperability is probably more important now than at any time in the U.S. Navy's history. The Department of the Navy's standardization efforts provide affordable and technically current specifications, standards, handbooks, qualification practices, processes, and tools that meet and anticipate the requirements of the fleet, acquisition personnel, logisticians, and engineers.

About the Author

Jeff Allan serves as both the Navy Departmental Standardization Officer and the Naval Air Systems Command's Standardization Executive. He has 30 years of experience working for the Defense Logistics Agency, the Office of the Secretary of Defense, the Defense Contract Management Command, and the Navy. In addition to his standardization responsibilities, Mr. Allan manages the Navy's aviation critical safety item process, supporting the Joint Aeronautical Commanders' Group–Aviation Engineering Board and other significant functions.

FORCEnet

Networking the Naval Combat Force

By Mike Stewart

FORCEnet is a communications system that enables the integration of warriors, sensors, networks, command and control, platforms, and weapons. It networks the joint combat force across the entire spectrum of conflict, from seabed to space and from sea to land. FORCEnet's architecture supports the elements of the Naval Transformation Roadmap and Sea Power 21 pillars of Sea Strike, Sea Shield, and Sea Basing, as well as the supporting initiatives of Sea Warrior, Sea Trial, and Sea Enterprise. FORCEnet also coordinates the transformation initiatives in the Army, Air Force, and Coast Guard.

One of the fundamental FORCEnet objectives is to develop a naval network infrastructure, with an integrated applications suite, that is fully interoperable among the military services, joint task force elements, and allied/coalition partners. The FORCEnet architecture ensures that design decisions made by component programs are consistent with the FORCEnet blueprint and incorporates common engineering, information, protocol, computing, and interface standards across various computing environments and platforms.

The FORCEnet architecture is based on a commercial distributed-services model. This offers the ability to reuse technology across the naval and joint enterprise by providing components that can be easily connected in a wide variety of ways to provide warfighters with new mission capabilities, but with minimal development effort and without requiring detailed knowledge of an application or its internal workings. The distributed services approach enables developers to package legacy allied and coalition applications for compatibility. The proposed multilevel security implementations allow for efficient and secure sharing of information.

FORCEnet Standards

FORCEnet integrates Navy and Marine Corps requirements by articulating operational, functional, and, ultimately, physical standards. Specifically, FORCEnet does the following:

- Defines the special architectural elements that enable increments of FORCEnet capability, which enables construction of an implementation road map
- Defines the specific architectural structure that enables development of the FORCEnet core product line
- Provides the background for programmatic decision support for the budget process
- Specifies the technical requirements to be satisfied by existing and planned programs to ensure that their systems conform to the FORCEnet architecture vision
- Identifies the operational concepts and technologies to be validated in the sea trial process.

The FORCEnet standards guide the design and acquisition of systems within the FORCEnet domain.

The standards documents are cross-referenced with initiatives such as the following:

- Joint Technical Architecture (JTA)/DoD IT Standards Registry standards
- Open Architecture Computing Environment
- Global Information Grid Enterprise
- Marine Corp Transformational Communications Architecture
- Air Force Command and Control Enterprise Technical Reference Architecture
- Army JTA.

Purpose of FORCEnet Standards

FORCEnet provides the technical foundation for the interoperability and seamless flow of information among strategic, operational, and tactical systems, as well as among the various naval, joint, coalition, and other agency systems.

Navy and Marine Corps systems are developed for a variety of tactical platforms (surface, subsurface, aircraft, portable, etc.). These systems are brought together, or "composed," to meet varying platform-unique mission requirements. Although platforms will have different antenna arrangements, physical dimensions, environmental conditions, work stations, information management processes, and associated communications suites, these component systems have similar component functions that can be cataloged and allocated across multiple systems. They can then become part of a core family of distributed FORCEnet services. These core distributed services can then be allocated across multiple systems and operational domains. Therefore, developing functional commonality and interoperability among these systems, despite dissimilarities in their physical configurations, ensures interoperability across all domains.

FORCEnet encompasses Navy technical architectures and shares many common objectives with other technical architectures such as Naval Centric Enterprise Services, Army Future Combat System, and Navy Task Force Web. FORCEnet objectives are as follows:

- Identify standards and technical guidelines for the development and acquisition of systems to significantly reduce the life-cycle cost, shorten the development time, and optimize the impact on program financial and execution performance
- Determine essential data formats and protocols to enable interoperability among components, both internal and external to a given system
- Select and define standards required for the migration of Command, Control, Communications, Computers, Intelligence Surveillance, and Reconnaissance (C4ISR) systems to an interoperable, open-systems environment
- Incorporate new and emerging standards to keep pace with global information and communications developments

- Use multi-mission distributed services and operational activities, such as precision geolocation, among similar or dissimilar platforms and sensors
- Define goals for network-centric operations, increased capacity and protection, global coverage, flexibility, information assurance, and system integration to support future needs of naval and joint forces.

In support of these objectives, FORCEnet standards were chosen based on the following criteria:

- *Interoperability and interchangeability.* Standards should support implementation of an open architecture, promote interoperability among FORCEnet-compliant systems, and, at the product interchange level, facilitate interoperability with non-FORCEnet systems.
- *Maturity.* Standards should be technically mature.
- *Ease of implementation.* Standards should provide technical implementation guidance and have reasonable market support for hardware, software, and development tools.
- *Public availability.* Standards should not be sole source or proprietary.
- *Compliance with authoritative sources.* Standards must be consistent with public laws, regulations, policies, and authoritative guidance documents.

The FORCEnet standards uniquely support the system acquisition community by documenting, under a single cover, the complete list of applicable protocols and standards from the alternatives allowed by overarching standards documents such as JTA. FORCEnet standards include mutually agreed upon standards when specific areas of concern are not addressed by overarching standards documents. FORCEnet standards also are a resource to other standards and architecture development forums.

Scope of FORCEnet Standards

FORCEnet standards encompass inter-platform and intra-platform interfaces necessary to support Navy, Marine Corps, Coast Guard, joint, and coalition strategic, operational, and tactical missions, as well as their subordinate functionality and performance objectives. The standards address information processing, information transfer, information modeling, metadata, information exchange, human-computer interface, information assurance, and physical services.

The standards contained in the FORCEnet architecture documents apply to all systems developed by the Navy and the Marine Corps. Specifically, the standards are used for modifications to existing components and for the development of future systems and components.

The standards continually evolve and are updated to keep pace with advances in information technology. When an emerging standard is appropriate for FORCEnet, the developing activity (commercial or government) should make the standard available for review. When a standard is governed by multiple domain standards handbooks, the most restrictive standard applies. Mandated standards are based on the best information available. Before the next version is released, mandated standards may be affected by any of the following:

- The organization sponsoring a standard may modify, void, supercede, or combine it with a different standard, or terminate support for the standard.
- The organization sponsoring a standard may transfer responsibility, or terminate support, certification, or compliance requirements.
- Commercial or government off-the-shelf vendors may withdraw from the sponsor's working groups, decide not to meet any or all of these mandates, or decide not to provide compliant products.
- Newly introduced military and industry standards may offer benefits that greatly outweigh those already listed in the FORCEnet standards.

Any of these activities could affect the ability of program offices and contractors to provide fully compliant systems. The goal is to provide workable solutions that enable systems to fully comply with FORCEnet standards.

Compliance Process

Ensuring compliance with FORCEnet architecture and standards requires the cooperation of the organizations defining the requirements, managing the programs, and evaluating the resulting programs. The following are examples of metrics, conditions, and changes:

- Compliance with government-industry design, software, communication, network, and interface standards and constraints
- Compliance with approved FORCEnet, joint, and DoD technical architectures
- Compliance with the FORCEnet compliance checklist.

Summary

The use of common and consistent standards is necessary to accomplish the integration of warriors, sensors, networks, command and control, platforms, and weapons into a networked, distributed joint combat force. Use of obsolete, proprietary, or conflicting standards will result in the further divergence of systems and the dissemination of information, inhibiting the ability to act upon that information. Using the documented FORCEnet standards in the beginning of the acquisition process is a first but important step in ensuring that capabilities delivered to the joint warfighter in the near and far terms are interoperable and provide the required information availability.

About the Author

Mike Stewart works in the Architecture and Standards Division within the Office of the Chief Engineer, Space and Naval Warfare Systems Command, in San Diego, CA. His responsibilities include working on FORCEnet standards. He also is the SPAWAR Standards Executive.

Standards Improve Navy Modeling and Simulation

By Conrad Dungca

In support of DoD and the fleet, the Navy has a modeling and simulation (M&S) standards project to improve the Navy's capability to develop tactics, training, and systems. The project's mission is to advance the Navy's development and application of M&S and data by identifying, coordinating, and promoting a common set of standards that enable Navy M&S to be interoperable, reusable, community accepted, credible, consistent, and flexible. The project involves frequent coordination with the other military services and several standards development organizations to identify and evaluate M&S standards.

Standards, particularly in the M&S community, have proven benefits. Among them are reduced costs, increased interoperability with other programs, the ability to retrieve and employ common authoritative data, reuse of M&S resources that are adapted or reconfigured quickly, consistency in communicating technical elements, consistent depiction of the real world in M&S software, and the ability to complete M&S faster, cheaper, and with less risk.

Also beneficial is the sharing of knowledge among interested parties that occurs through standardization. Through sharing, cross-pollination of ideas from disparate communities and geographic localities is bound to take place. Ineffective stovepipes begin to fall down, resulting in freer exchanges of information that contribute toward interoperable M&S among the user communities.

Background

In 1999, the Navy Modeling and Simulation Management Office (NAVMSMO) began exploring ways to meet the need of the Navy M&S community for M&S standards. NAVMSMO organized a group of Navy M&S experts, currently referred to as the Navy M&S Standards Steering Group (MS3G), that represented a wide range of functional interests. The group reviewed ongoing standards activities, especially those of the Simulation Interoperability Standards Organization (SISO) and the Army Modeling and Simulation Office (AMSO). Feedback from these subject matter experts and Navy M&S leadership provided the foundation for the Navy M&S standards project.

Today, the MS3G executes the Navy M&S standards process to nominate, evaluate, and advocate M&S standards. The group's work directly supports NAVMSMO's role in providing centralized management of Navy M&S, coordinating M&S efforts across functional areas, and developing policies and guidance necessary for M&S standardization within the Navy. The MS3G works closely with AMSO and the Air Force Agency for Modeling and Simulation to coordinate joint M&S standards activities. These joint efforts have benefited the services and support the position for DoD-wide M&S standards initiatives.

Organization

The MS3G has representation from the Navy Secretariat, Chief of Naval Operations, fleet, and systems commands. Broad participation ensures that candidate standards are evaluated and appropriately promoted throughout the Navy. Participation in the MS3G is limited to government personnel and their designated representatives. Although MS3G membership is replete with domain experts, it is not primarily a technical deliberation body.

MS3G subgroups champion and monitor a nominated Navy M&S standard from the time the need is identified to the time it is approved, promulgated, and advocated. The subgroups also participate in periodic reviews of the standards approved in their respective areas of architecture; Command, Control, Communications, Computers, Intelligence Surveillance, and Reconnaissance (C4ISR); data; interoperability; logistics; synthetic natural environment; and verification, validation, and accreditation.

The MS3G has three types of subgroups:

- Application Planning and Review Groups (APRGs) identify specific application needs and represent experts in functional areas of the Navy M&S community.
- Technology Area Groups (TAGs) address needs as they are identified, researching, analyzing, and reviewing M&S standards submissions.
- Special Interest Groups (SIGs) are created when no APRG or TAG exists to address a specified need; if appropriate, a SIG may evolve into an APRG or TAG.

Each APRG ensures that each TAG is aware of existing application needs. Each TAG ensures that each APRG is also aware of nominated technology standards. Figure 1 depicts the interrelationship between the MS3G, the APRGs, and the TAGs.

Process

The Navy MS3G developed an M&S standards evaluation process to support NAVMSMO. The phases and supporting steps within this evaluation process focus on three key activities: nominate, evaluate, and advocate Navy M&S standards. The process concept, depicted in Figure 2, is to involve government and industry in

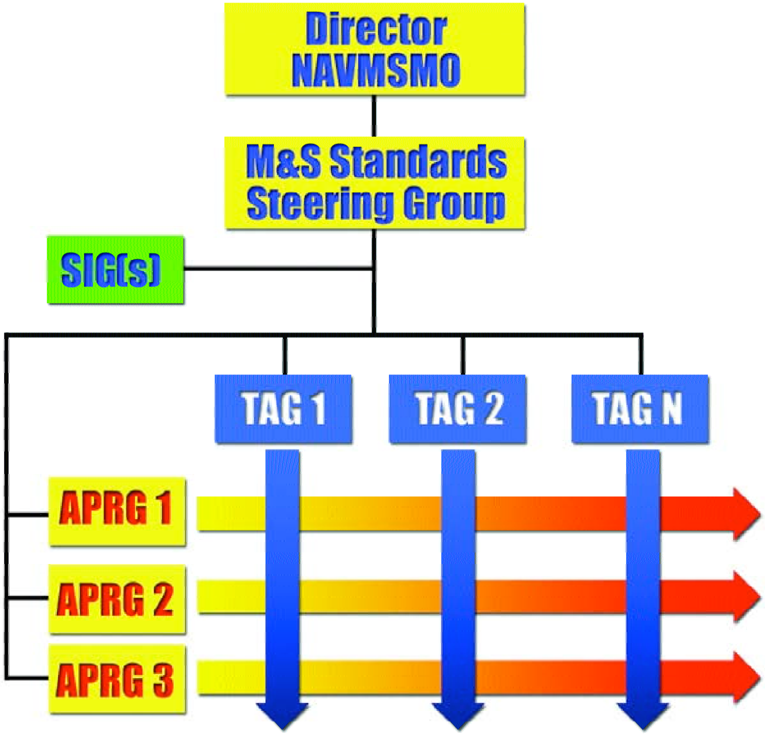


FIGURE 1. The MS3G Organization Relationships.

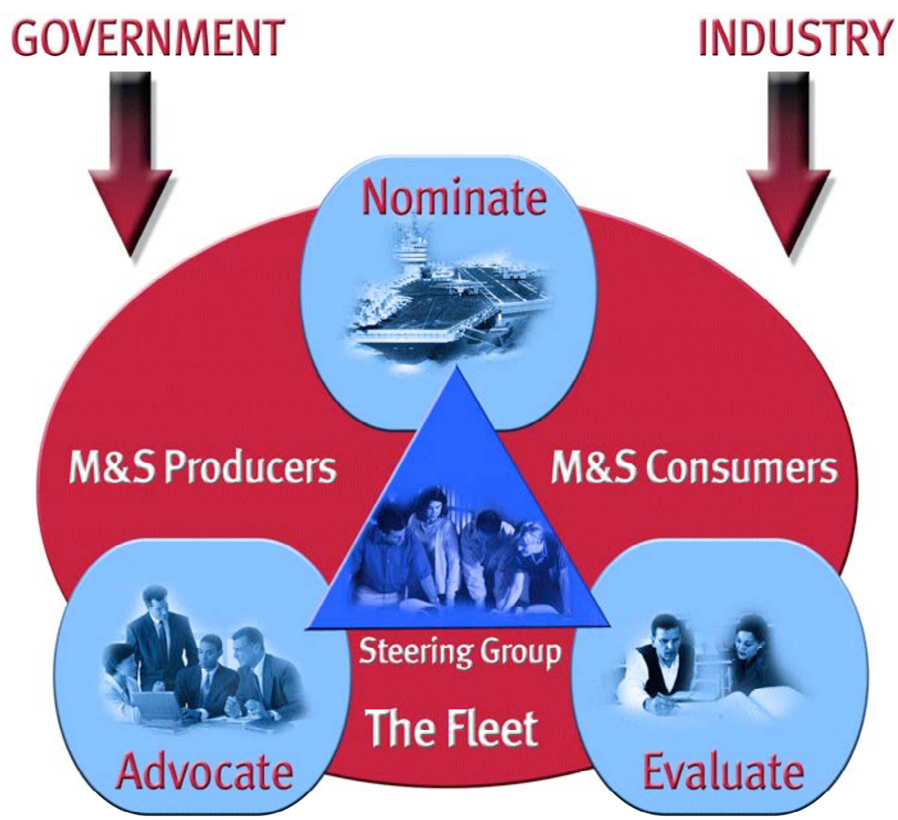


FIGURE 2. Navy M&S Standards Concept.

supporting M&S producers and consumers.

In the nomination phase, the Navy M&S community can identify potential standards. The entrance point to the system is a simple, web-based submission form—Standards Needs Document (SND)—available on the NAVMSMO website. Submission of an SND, which describes the nominated standard, activates the evaluation process. The SND moves through the system to various organizations and people and is dynamically routed depending on the affected subject category. During this initial phase, options include changing the primary category for the nominated standard, withdrawing the nominated standard entirely, or allowing the nominated standard to proceed to the first step in the evaluation phase.

The evaluation phase consists of several steps: technical review by a team of M&S experts, internal review by the MS3G, review by the Navy M&S community, formal ballot on the standard, and review by the NAVMSMO director. The evaluation phase also includes a mechanism to provide feedback to the submitter of the nominated standard at each step of the process.

The final phase is to advocate the standard. The nominated standard is posted to the World Wide Web for final publishing and is further advocated through community outreach. This outreach includes collaboration with other standards projects and an M&S standards awareness program. A periodic scheduled review of ap-

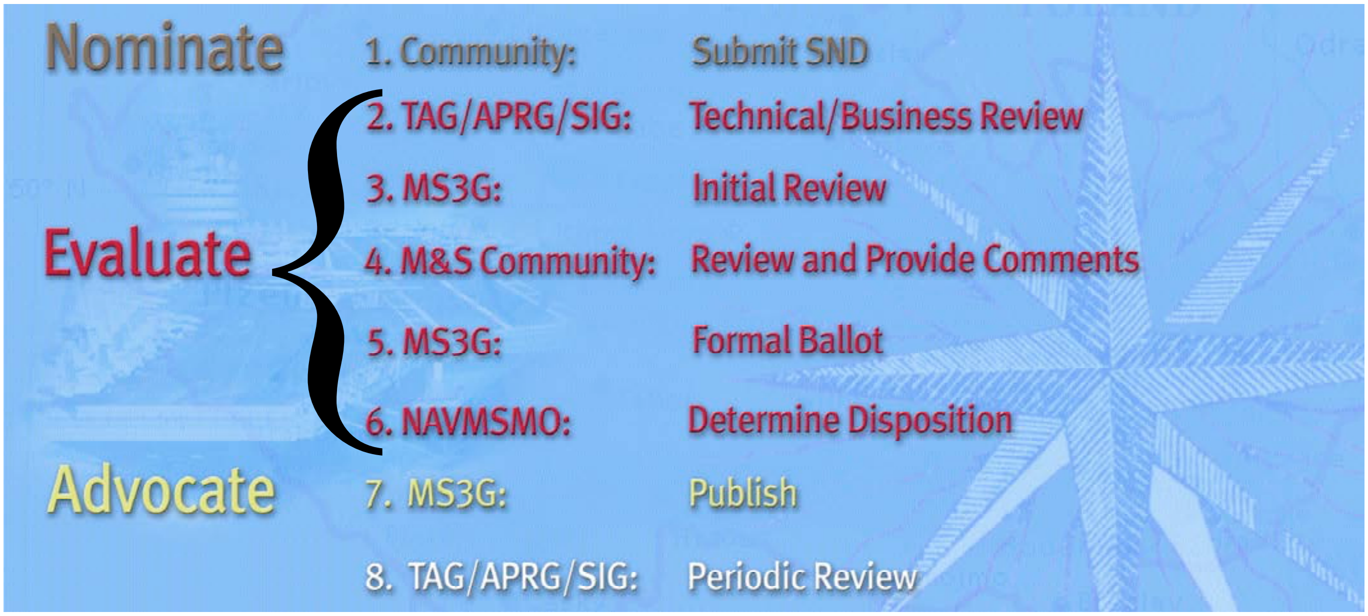


FIGURE 3. The MS3G Process Steps.

proved standards checks for continued applicability.

Figure 3 summarizes these process steps. Throughout the process, the MS3G uses the Standards Nomination, Evaluation, Advocacy and Central Repository System to track and store the nominated standard's SND description and associated documentation.

For a more detailed description of the process, please visit the Navy M&S standards website via the NAVMSMO home page at navmsmo.hq.navy.mil and download the *Navy M&S Standards Policy and Procedures Manual*. Select M&S Standards from the vertical menu on the NAVMSMO home page. Once at the Navy M&S Standards home page, select Process on the horizontal menu. The link to the manual is located at the bottom of the process description.

Challenges

Standards are not always readily accepted. Even when sound technical benefits are demonstrated, multiple types of impediments can hinder successful execution of standards-based approaches. When sponsors, developers, or users have the added responsibility of adhering to a standard, they may soon become fearful of the impact on cost and schedule; this can result in exaggerated compliance cost estimates, administrative and technical roadblocks, and, at worst, political stonewalling. This problem is especially prevalent in situations where an otherwise good standard is mandated before a sufficient amount of community review and comment, technical usage, and a certain degree of community buy-in is accomplished.

The most useful standards will be easier to use than to deviate from, are widely accepted by the community, and endorsed by appropriate authorities. The Navy endeavors to sufficiently engage stakeholders and establish credibility for candidate standards. This is achieved through reviews by key technical personnel and broad-based community participation at critical milestones in the approval process.

Successes

The MS3G review process has resulted in several M&S standards success stories. Examples include several International Organization for Standardization (ISO) standards that use ISO 10303, Standard for the Exchange of Product Model Data (STEP), which is recommended to support faster, better, cheaper Navy simulations. The STEP development community is working to ensure that the standard supports international product model exchange requirements. The Navy and the commercial ship community are participating to ensure that their product model data can be exchanged to support real business processes. Integrated resource subroutines within STEP address geometry, materials, tolerances, configuration management, and other general requirements. Application protocol (AP) subroutines have been developed to address specific products and processes.

- AP 215:2004 supports subdivision of ships into compartments and zones, volumetric capacity calculations, compartment connectivity/adjacency checking, stability calculation and spatial accessibility, area/volume reporting, and tank capacities. Availability of digital compartmentalization information can eliminate manual data entry of vulnerability tools.
- AP 216:2003 addresses principal hull-form dimensions and characteristics, internal compartment boundaries, appendages, hydrostatic properties, propellers, and control surfaces. Exchange of hull-form data can facilitate loading hydrodynamic and hydrostatic software analysis tools.
- AP 218:2004 (planned) addresses transfer of data for shipbuilding activities and applications associated with design and the early stages of manufacturing such as plates, stiffeners, profiles, assemblies, connectivity, welds, approvals, and change identification. In a digital format, such data promote interoperability among structural, radar cross-section, and manufacturing simulations.

Collaborative Opportunities

The Navy M&S standards project has a collaborative partnership with both the Army and the Air Force M&S standards programs. Representatives from these sister service programs regularly participate in the Navy MS3G meetings and standards reviews. This partnership enables the services to share valuable lessons learned and to work together on standards that benefit the joint community. The Navy also maintains a solid relationship with the Defense Modeling and Simulation Office (DMSO) in order to continue and strengthen support to DoD M&S standards initiatives. In April 2004, the Defense Standardization Program Office approved a new standardization area—Modeling and Simulation Standards and Methodologies—and designated DMSO as the lead standardization activity. This action will create new, collaborative standards opportunities, as well as greater visibility for M&S standards.

In addition to promoting the use of standards in the Navy M&S community, MS3G members participate in SISO activities by supporting user and technical forums at SISO's Simulation Interoperability Workshops whenever possible. The Navy M&S standards project will continue relevant coordination with other DoD agencies and with commercial and industrial partners in the identification and evaluation of M&S standards. We encourage the M&S community to visit the Navy M&S Standards website and to participate in Navy MS3G meetings and standards activities.

About the Author

Conrad Dungca is the chair of the Navy MS3G. He has served as a Navy pilot, and is currently a program manager and engineer working at the Space and Naval Warfare Systems Center in San Diego, CA.

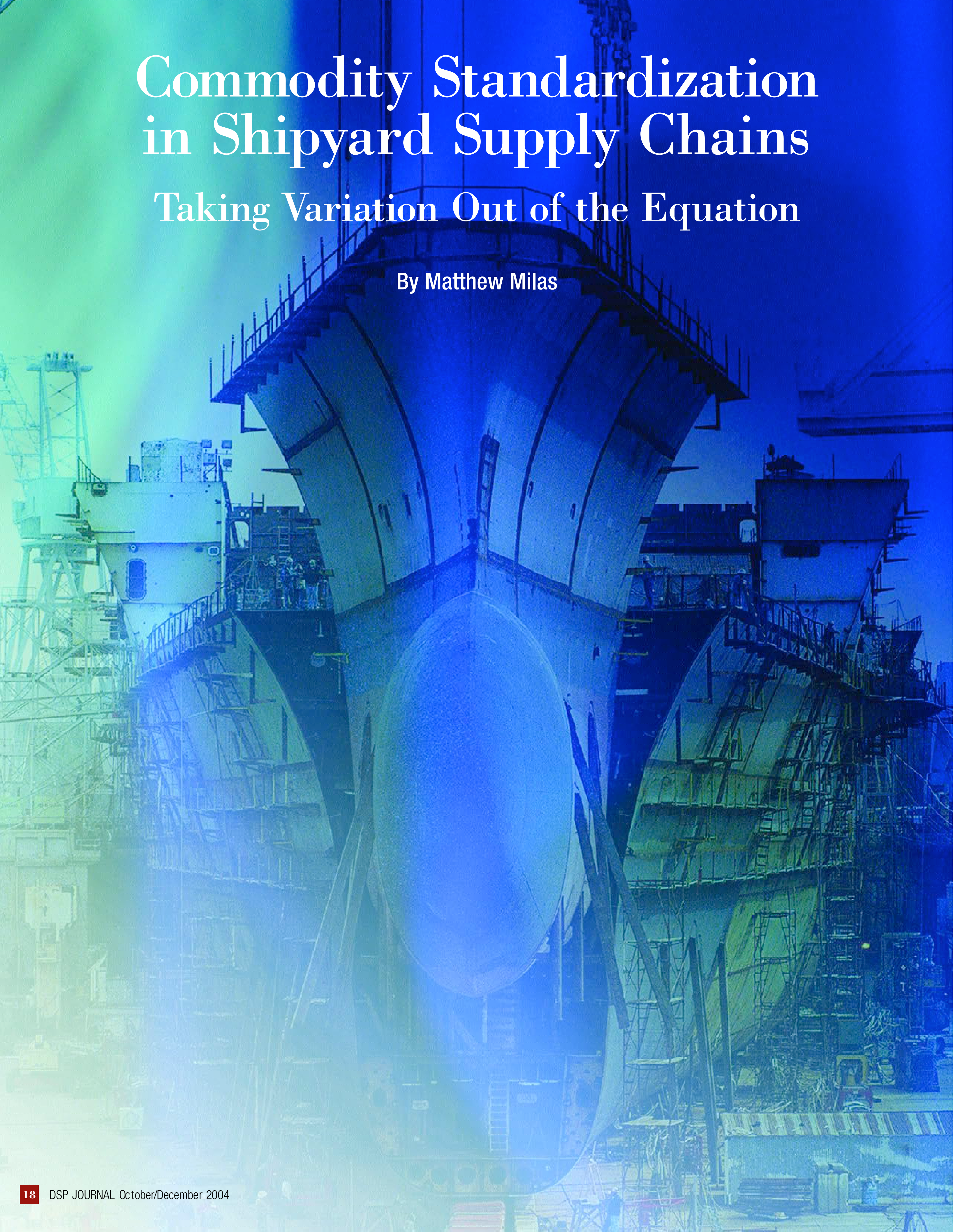
Participation Opportunities

- Visit the website (navmsmo.hq.navy.mil)—select "M&S Standards"
- Subscribe to the Navy M&S standards general e-mail reflector to receive important announcements—select "Reflectors" to choose the general reflector
- Nominate an M&S standard—select "Submit SND"
- Review our approved M&S standards—select "Standards"
- Subscribe to one of the subgroup e-mail reflectors to participate in technical reviews and contribute your expertise—select "Categories" for a description of subgroup areas, then select "Reflectors" to choose specific reflectors
- Receive Navy M&S standards support at standards@navmsmo.hq.navy.mil

Commodity Standardization in Shipyard Supply Chains

Taking Variation Out of the Equation

By Matthew Milas



Shipbuilding supply chains specify and carry a wide variety of slightly different, but functionally equivalent commodities for shipyard construction projects. Carrying inventories to meet the highly variable demands for these parts incurs material management, purchasing, receiving, fabrication, and overall material costs. Even though most shipyards recognize the enterprise value of commodity standardization, most find it difficult to evaluate the total benefits to the shipyard (and the total supply chain) versus the cost of the engineering changes required to standardize parts. The National Shipbuilding Research Program commissioned a study through the collaborative effort of General Dynamics–Bath Iron Works, Northrop Grumman Ship Systems–Ingalls, American Steel and Aluminum, and Altarum Institute to investigate the benefits of commodity standardization versus the costs—the subject of this article.

Introduction

Shipyards often have cases where near duplicate and substitutable parts are used and carried through the supply chain. The study found that typically 20 percent of commodity items represent 80 percent of all commodity usage. The remaining 80 percent of commodity items are used less than 20 percent of the time. Many of these items can be eliminated through standardization, and thereby reduce the costs of commodity specification variation.

A single shipyard can have more than 20,000 catalog numbers for stocked commodity items. The large number of cataloged items requires the entire supply chain to keep stockpiles of inventory and work in progress to meet the wide range of demands for production, not to mention the aftermarket maintenance, repair, and overhaul. Catalog items often face very different demand patterns. Some items are required in many installations per ship, while others are used in only a single installation per ship. Common sense suggests that the items with higher demand will have larger inventory costs. Surprisingly, the inventory costs for high-demand items can actually be lower than they are for low-demand items. Inventories for rarely used items are larger than expected because of the minimum ordering quantities imposed by suppliers. These stockpiles are also slowly depleted due to their low demand. Large, slowly depleted inventories occupy valuable space and tie up working capital, as well as other valuable resources, for years.

Standardization Benefits

So what are the actual savings that shipyards can expect from commodity standardization? Well, the answer isn't always clear-cut. Benefits are generally within a range, depending on material handling and other inventory policies. Table 1 contains an average range of savings for shipyards. The savings range can be used as a guideline for estimating the value of standardization, but actual benefits may be outside this range.

Commodity standardization has additional "soft" benefits that could actually be more valuable than the quantifiable ones.

Benefits	Savings
Lower carrying costs (cost of capital, insurance, tax)	10–15% of difference between old and new inventory values
Less scrap	(10–20% of old inventory value) – (5–10% of new inventory value)
Reduced material handling	5–15% of difference between old and new inventory values
Piece-price reduction	0–5% of new inventory value
Less obsolete materials	1–6% of old inventory value
Less expediting	25–75% decrease in expediting for commodities
Less error and rework	(5–15% of old inventory value) – (0–10% of new inventory value)

TABLE 1. Average Savings from Commodity Standardization in Shipyards.

Note: Calculations are based on the Institute of Supply Management industry standards, adjusted for shipyards using the Altarum Supply Network Analysis Program simulation tool and data provided by shipyards.

The main soft benefits include the following:

- Improved configuration control and Diminishing Manufacturing Sources and Material Shortages (DMSMS) management
- Less inventory damage and shrinkage
- Lower logistics costs
- Reduced accounting time
- Less paperwork and document retention
- Lower ordering and transaction costs
- Less time processing, receiving, and inspecting
- Improved manufacturing familiarity with standards
- Reduced manufacturing setup times
- Reduced double and triple handling of remnants (raw stock cutoff)
- Reallocated staff hours from more efficient operating
- Less time picking and sorting material
- Better ability to handle surges and disruptions in demand and supply.

The overall demand for commodity items is not going to change through standardization; the same amount of steel is going to be used when building a ship. Combining commodity items into standard stock can reduce inventories by reducing the variation in demand and thus reduce the safety stock levels. Standardizing commodities also serves to protect against local demand surges and disruptions that lead to “Not Available” material.

Engineering Standardization

How come commodities haven’t been standardized yet? With all of the benefits, it seems like an easy way to save time and money. The answer is simple: commodities don’t command much attention. The savings are often drowned out by the large costs of the engineering changes necessary to make commodities standard. This has been cited as the main reason, but how much engineering effort is really required? Well, that depends on the kind of change and the magnitude of the change.

The study found that commodity standardization can potentially take place in three main ways: material standardization, dimension standardization, and design standardization.

Material standardization is the global substitution of one material type for another. For example, a ¼" thick 2" × 2" × 20' carbon angle bar can be ordered from suppliers in unit or in feet at material Grades A, or A-36, and each has its own catalog number. The opportunity becomes apparent when you realize that the prime integrator receives the same piece from the same millrun, at different prices due to the certification requirements, completely independent of the catalog item that was ordered. Global material substitutions using standard material grades can eliminate redundant catalog items by roughly 30 percent.

Material substitutions only require minimal engineering time to make sure that the standard material will meet requirements; that translates into 20 to 60 hours of engineering time for an entire commodity. With savings in excess of the engineering costs generated every year, material substitutions offer a fast, effective, and inexpensive opportunity to standardize commodities.

Dimension standardization is the standardization of commodity dimensions around fewer size specifications. An example of this is reducing the ¼" 2" × 2" × 20', the 3/16" 2" × 2" × 20', and the 5/16" 2" × 2" × 20' carbon angle bars to just the ¼" item. Eliminating low-use commodities cuts inventory costs for production and later overhaul.

Dimension substitutions are obviously more costly than material changes. The engineering changes now must encompass areas like weight, interference, and shock testing, and they apply to each instance and drawing in which that commodity is used. The total time to make those changes can range from 40 to 160 or more hours per commodity, depending on the number of drawing checks required. These costs can quickly become prohibitive, so dimension standardization is not going to be a cost-effective method for commodity standardization.

Design standardization refers to designing with standard commodities from the beginning. The opportunity to undertake this type of standardization presents itself only during new ship design. It is true that only 5 percent of a ship's total cost is spent at design, but more than 80 percent of the cost impact is decided at design. Designing standardization builds in value.

The benefits of design standardization are even greater than reengineering standard commodities. To implement design standardization, designers must be educated about the value of using standardized commodities and "lean thinking." Overall ship production and life-cycle maintenance costs will go down if designers choose from a standardized criterion for mill-standard commodities that have high use throughout the ship.

Reducing the number of choices helps to design with standardization by reducing the chance that a designer selects a low-usage commodity without even realizing it. For example, the 1¾" pipe used in only one fabrication probably did not need to be designed into the piping system.

Designers have not had to evaluate standardization as a part of the design process, and that is because the enterprise costs have received little attention. An educational program is required to inform designers about lean thinking and commodity standardization to integrate design standardization into new ships, especially with the design of future Navy weapons systems such as the DD(X) destroyer and littoral combat ship.

Additional Costs

Engineering costs are cited as the main reason not to perform commodity standardization. Engineering hours are costly, because they accumulate through the drawing checks, shock tests, and certifications for part substitution. In addition to the costs of engineering changes, other costs must be weighed:

- Planner labor to coordinate the use of on-hand inventory
- Scrapping of old, unused inventory
- Piece-price increases for higher grade standards
- Establishment of new inventory policies
- Establishment of new storage and planning procedures.

Standard Risks

Standardization offers many benefits, but there are also associated risks. The main risks are related to excessive costs and commodity dependencies. If the cost of standardization outweighs the savings, then it does not make sense to make the change. Likewise, if standardization creates risky dependencies on a small set of commodities where supply interruptions could stop production, then commodity standardization becomes a poor choice. Prohibitive costs are typically in the form of engineering changes, but can include increased material costs and other one-time costs. Commodity dependencies can cause destructive effects on production if the commodity demand cannot be met because of DMSMS, demand surges, or other potential problems. Other risks could arise if defective commodities are installed; with standard commodities, the defect would impact more sections of the ship. However unlikely, dependency risks can be buffered against through the application of lean quality concepts and strong supplier relations to meet demand. These risks must be assessed for each shipyard; unfortunately there is no standard risk model.

Summary

Despite the potential costs and risks of standardized commodities, significant value can be gained if we take advantage of the opportunities. Reengineering commodity standards into current ship designs has definite costs, but it can result in substantial savings. Material standardization in commodities alone could reduce the number of catalog items by approximately 30 percent. But imagine the chain reaction commodity standardization would have if it were driven into ship design. If a new ship were designed using standard pipe-size criteria of 1", 2", 4", and 6", then the associated flanges, gaskets, pipe-hangers, fittings, and fasteners for other pipe sizes would not need to be ordered and stocked, nor would any special manufacturing processes be required for different sizes. Standardization would impact the life-cycle cost of the ship, from design, to procurement, through manufacturing, and all the way to repair and overhaul. The effect of commodity standardization would spread throughout the supply chain and the entire enterprise, creating a wake of savings.

About the Author

Matthew Milas is a supply chain engineering analyst at Altarum Institute, a not-for-profit research and development institute in Ann Arbor, MI. He specializes in project management, obsolescence and technology management, and the convergence of lean, six sigma, and the Supply Chain Operations Reference (SCOR) model.

Public and Private Shipyards Strive to Achieve Repair Part Commonality

By Ron Nason

In today's environment of constrained acquisition resources, the Navy is looking inward to locate opportunities for standard software tools, databases, and support items to achieve cost savings that can be recapitalized for future weapon systems, new construction ship acquisitions, and fleet maintenance. This is one of the biggest potential sources of cost savings in the material support area. If the Navy can "single-up" its material requirements and buy in bulk, it can leverage industry and achieve significant cost savings. However, one of the largest impediments to this approach is the disconcertingly high level of non-standard repair parts, especially in the area of Hull, Mechanical, and Electrical (HM&E) equipment. Admittedly, many logistical and technological factors drove this high level of non-standard material. (Non-standard material is any material that is neither identified with a national stock number, or NSN, nor supported by some alternative method such as a Performance Based Logistics or Prime Vendor contract.)

Achieving repair part commonality will be a challenge in an environment where the requirements are so diverse. However, the Navy has undertaken two key initiatives—Pattern Card Database (PCD) and Common Parts Catalog (CPC)—designed to address the challenge.

Pattern Card Database

Traditionally, the various naval shipyards (NSYs) have met their non-standard material requirements by doing the procurement research themselves, procuring the item locally, and then managing it under a local stock number. The downside of this approach was that individual NSYs were performing research, issuing procurements, and executing management functions for the same item multiple times. This lack of uniformity and centralization of the non-standard material process resulted in unnecessary delays in procurement, an inability to discern candidates for standardization, underutilization of bulk buy and other economic order quantity strategies, increased quality assurance inspection requirements, and so on. The bottom line was that the traditional approach led to repetitive man-hours expended in researching, developing, and resolving material requirements, leading to increased workload and extra costs at all levels of the NSY ordering chain.

In February 2003, the NSY leaders agreed to use the PCD at the Fleet and Industrial Supply Center at Pearl Harbor (FISC-PH) as the central platform for managing all technical data related to non-standard NSY material. A "pattern card" is simply a database record, representing an individual non-standard item, into which all the descriptive technical characteristics of the item can be entered as discrete elements.

The PCD will aggregate the non-standard material technical data from all NSYs, assign "global stock numbers," and organize the data into a searchable format. Achieving this end-state has three critical aspects:

- The PCD project must establish set rules for assigning unique global stock numbers. These rules will ensure that, as new local stock numbered items are introduced into the PCD, they will be entered under an existing global stock number if their technical characteristics match. This will enable the NSYs to single-up their non-standard material requirements and to identify candidates for standardization and supply system support.
- The PCD project must determine which technical data elements are required and then establish rules to ensure that material descriptions are uniform. Otherwise, the search fea-

ture of the PCD will not result in appropriate or valid item matches.

- The PCD project must result in the development of a single document management system that is capable of organizing, categorizing, and managing thousands of individual pattern cards.

Today, the PCD initiative is well underway. The Customer Service Group at the Navy Supply Information Systems Activity, Mechanicsburg, PA, has established the initial set of approximately 4,500 pattern cards from Pearl Harbor NSY, and it has mapped non-standard data from both Pearl Harbor NSY and Puget Sound NSY to populate the PCD. In addition, Norfolk and Portsmouth NSYs have delivered their initial datasets. The Defense Logistics Information Service has been instrumental in comparing the four shipyards' non-standard requirements in an attempt to consolidate like demand data. Of course, much work remains to be done before the true value of the PCD can be realized. First, all four of the shipyard databases must be mapped and interfaced. Then, some engineering resources will have to be applied to review and validate the technical matches generated by the PCD. All represent investments of time and resources, but the potential benefits of the PCD make it well worth the effort.

Common Parts Catalog

The CPC project, started in 1999, is geared toward achieving parts commonality in the private shipyard community. Sponsored by the National Shipbuilding Research Program, a collaborative Navy/industry research program, the CPC project will interface with existing cataloging best practices at various private industrial activities. The CPC has two identical data environments electronically connected to enable multi-corporate part standardization via real-time technical information sharing. The first of the data environments is already in operation, and the second was scheduled to be deployed in June 2004. Linkage of the two environments was slated for August 2004.

Implementation of the CPC will support establishment of inter-shipyard part data standards, enable determination of part commonality/equivalency, and enhance part data configuration management. The CPC is scalable and will accommodate continued growth of data, users, and user sites. The current shipyard enterprise implementation plan contains four separate tasks:

- Three first-tier shipyards will implement the CPC and provide the necessary deliverables (procedure documentation, data dictionary, model architecture, etc.) that will enable the CPC to be deployed to other shipyards.
- The remaining first-tier yards will assess adaptation of CPC to their yards and to Navy projects and will determine how and to what extent they will participate in the CPC.
- The CPC will be deployed to second-tier yards. In addition, a CPC-based system architecture will be developed that is more suited to the ship repair functions performed at these yards. This development effort will leverage an existing second-tier shipyard project, known as the Material Identification and Procurement System, which is being funded by the Office of Naval Research. One of the second-tier yards has begun implementing the CPC internally and will evaluate the benefits of sharing CPC data with the larger community.
- Interoperability interfaces with the NSYs, other fleet maintenance activities, and the naval supply community will be explored.

Because interoperability interfaces could be developed somewhat concurrently, the Maritime Industrial Support Department (Code 843) at Naval Inventory Control Point (NAVICP) hosted a CPC workshop on March 11, 2004. The purpose of the workshop was to gain an enterprise-wide assessment of CPC applicability to Navy logistics/material support processes and to identify possible modes of data interconnectivity. An array of government and private industry logistics experts—from waterfront expediters to headquarters strategists—participated in the workshop. The group reached consensus on several points:

- Private shipyard design agents are best equipped and positioned to make decisions about part equivalency/commonality and part data configuration.
- Continuous connectivity from design through construction through the life cycle would show cost savings through reduced and leveraged buys.
- CPC could enable much earlier identification of obsolete material.
- Connectivity to CPC would improve the quality and quantity of Navy acquisition logistics support data.
- CPC directly supports the current HM&E standardization effort.
- CPC is not currently a procurement vehicle, but is a good tool for determining alternative material sources.
- CPC connectivity should be addressed through the Navy supply system, rather than through the individual NSYs.

The workshop continued with a discussion of the issues to be addressed and the "road ahead." Data security and Navy Marine Corps Intranet interoperability would have to be addressed. CPC currently has no inventory tracking or material ordering functions, but there should be an opportunity to connect with EMALL, an Internet-based material ordering system managed by the Defense Logistics Agency. Another issue of concern was the process for inserting NSNs into the CPC Part Equivalency Program. Right now, the CPC lists an NSN if it is known to be an equivalent of a CPC number. However, there is no current or planned ongoing function to maintain

NSN equivalency. In order for the CPC to fully support HM&E standardization, this ongoing public-private equivalency would have to be maintained by all participants. The final issue discussed was Navy participation in the CPC. Since CPC connectivity will require some sort of fee based on the level of participation (subscription or full participant), the costs and benefits will have to be analyzed to determine the most cost-effective level of Navy participation and to provide the justification necessary to secure support funding.

The participants of the workshop agreed to pursue the following activities in support of the CPC:

- Naval Sea Logistics Center will investigate the potential benefits of connecting CPC with the HM&E Equipment Data Research System.
- NAVICP will determine a method for quantifying the potential savings that CPC would generate by increasing the accuracy and quality of the Weapon System File data.
- NAVICP will investigate CPC connectivity as a replacement for Supplementary Provisioning Technical Data in the provisioning process.
- NAVICP will identify necessary team members for future CPC meetings and workshops.
- NAVICP will determine methods for analyzing the costs and benefits of different levels of Navy participation in the CPC.

Conclusion

Different groups for different reasons undertook the PCD and CPC, but the projects are highly complementary in design, and they strive to reach a common objective in the public and private arenas. These projects profit from strong leadership and organizational support, and both feature capable and energetic participants. In the end, I believe these two projects will achieve their goals and provide valuable resources to sustain the growth of the Navy's warfighting capability.

About the Author

Ron Nason is a career logistician who has served and worked in supply and maintenance for all three military departments. He is currently the director of the Maritime Industrial Support Department at the Naval Inventory Control Point in Mechanicsburg, PA.

NAVSEA's HM&E Equipment Data Research System (HEDRS)

By Keith E. Doyne, HM&E Standardization Program Manager, and Daniel E. Martinez, Program Support, Naval Sea Logistics Center

The following article highlighting HEDRS and its potential ILS cost benefits was featured in the September/October issue of Navy Supply Corps Newsletter.

Thanks to the Defense Standardization Program Office, the HEDRS website now includes an integrated logistics support (ILS) cost calculator function, which enables the user to estimate total life-cycle ILS costs associated with the procurement of new equipment. Using an algorithm validated by the Naval Audit Service, the calculator estimates costs for seven ILS elements: provisioning, maintenance of national stock numbers (NSNs), training, technical manuals, installation drawing changes, configuration control, and planned maintenance. The algorithm is based on variables such as the estimated life of the equipment, the number of maintenance-significant repair parts in the equipment, the number of ship classes on which the equipment will be installed, the price of the equipment, and the total pieces of equipment to be procured.

The HEDRS website is located at www.nslc.navsea.navy.mil/. Simply click Products, and then select HM&E Equipment Data Research System (HEDRS) from the list. First-time users then click Registration. Registration approval requires about 24 hours.

For questions or comments, contact Keith Doyne, Naval Sea Logistics Center (05311), at 717-605-2065 or DSN 430, or by e-mail: DoyneKE@navsea.navy.mil.

The HM&E Equipment Data Research System (HEDRS) is NAVSEA's primary tool for supporting the objectives of its Hull, Mechanical & Electrical (HM&E) Equipment Standardization Program. The program's major objectives are based on USC Title 10, Chap. 145, Section 2451, which requires the Secretary of Defense "to the highest degree practicable standardize items used throughout the Department of Defense by developing and using single specifications, eliminating overlapping and duplicate specifications, and reducing the number of sizes and kinds of items that are generally similar."

The objectives include:

- Reduce equipment life-cycle logistics costs.
- Reduce, to the greatest extent possible, the number of sizes and types of equipment that have similar functions.
- Provide for common usage of equipment to promote commonality among weapons systems.
- Maximize the use of standard design equipment, parts, materials, and processes to lower costs, reduce downtime, facilitate interchangeability, enhance maintainability.
- Maximize repetitive use of existing, reliable, and fully supported equipment.
- During system design, redesign, or production stages, exclude, to the maximum extent practical, equipment that is not fully supported.

Background

In the 1980s, under the cognizance of the joint Naval Sea Systems Command/Naval Supply Systems Command HM&E Equipment Standardization Committee, the program began examining the proliferation of HM&E equipment. The proliferation of new equipment introductions into the Navy's inventory translates to higher integrated logistics support costs for provisioning, new NSN maintenance, training, tech manuals, installation drawing changes, configuration control, and planned maintenance.

A life-cycle ILS cost algorithm was developed by NAVSEALOGCEN, and validated by the Naval Audit Service, which conservatively quantified these costs. In a 1988 study, NAVSEALOGCEN found that proliferation of allowance parts lists (APLs) for like items of HM&E equipment had reached unacceptably high levels, causing significant support problems.

The fleet had more than 180,000 different types of HM&E equipment, each supported by individual parts lists, technical manuals, preventive maintenance documents, training courses, and training equipment. Moreover, some 8,700 new HM&E APLs were generated each year, resulting in the annual assignment of more than 28,000 new national stock numbers (NSNs), which added to the already voluminous list of logistically managed supply items.

Since the late 1980s, NAVSEALOGCEN has focused its HM&E standardization program on reducing the unnecessary introduction of new HM&E equipment—in other words, to reduce the number of unique or nearly unique HM&E APLs.

HEDRS

HEDRS is a collection of databases and analytical programs with which the acquisition, maintenance, operations, engineering, planning, and logistics communities can research HM&E equipment data and resolve emergent or anticipated problems. Originally produced and distributed as a CD-ROM product, HEDRS data and capabilities are now available via a password-protected Internet site.

HEDRS contains unclassified information on approximately 150,000 HM&E non-developmental items installed in the fleet. HEDRS includes four major types of data:

- Components Characteristics data, which describes form, fit, and function attributes.
- Equipment Applications data, which documents in what ships and systems an equipment is installed.
- Supportability data, derived from a manufacturers survey, and includes commercial-off-the-shelf status, and planned discontinuance information.
- Integrated Logistics Support (ILS) data, which includes information on the availability within the Navy of support documentation such as tech manuals, program manager, and drawings.

HEDRS has a number of user-friendly capabilities to query, retrieve, analyze, and store data. Below are a few examples of the analyses that can be performed using HEDRS.

- *Feasibility of equipment substitution.* If equipment replacement is required, a user can query HEDRS to find equipment installed in the active fleet that meets the desired specifications.
- *Identification of potential problem equipment (Diminishing Manufacturing Sources and Material Shortages—DMSMS—candidates).* A user can identify HM&E equipment that is obsolete or foreign-source dependent. This capability is essential in helping programs avoid selecting equipment that will cause downstream problems.
- *Application of the equipment.* A user can identify all HM&E equipment APLs installed on a particular ship and can retrieve a breakdown by equipment category (valve), equipment class (relief valve), or service (main propulsion boiler safety relief valve). The user also can determine the application of specific equipment across the fleet.
- *Configuration comparisons.* Users can compare a selected ship's equipment complement with that of up to 20 other user-selected ships. This feature can be used by operations personnel and others to identify potential immediate sources

of support while underway, or in ports where normal supply chain support is limited.

Achievements

As a result of its HM&E standardization program, NAVSEALOGCEN has dramatically reduced the unnecessary introduction of new HM&E equipment in the fleet.

A study of the construction of the LHD 1 amphibious assault class ship revealed poor standardization results—only 60 percent of the HM&E equipment used in the LHD 1 was already in the Navy's fleet inventory at that time. LHDs 2, 3, and 4 were built using the same approach, with the same disappointing results.

The HM&E standardization program has allowed NAVSEALOGCEN to dramatically reduce the unnecessary introduction of new HM&E equipment into the fleet.

Beginning with LHD 5, and continuing with LHDs 6 and 7, the Navy developed the LHD Class Standardization Program Plan using HEDRS, along with monetary incentives, to achieve dramatic improvements in standardization. The Standardization Program Plan required the shipbuilding contractor to maximize the use of equipment and components from a number of lists generated by HEDRS to achieve the maximum level of interchangeability of equipment and components by reducing the number of unique items of like function installed in the ship. The standardization results for LHDs 5, 6, and 7 were dramatic in terms of intraship, intraclass, and intrafleet standardization.

The LPD 17 amphibious transport dock ship program is another excellent example of "smart" standardization. The program uses its own Standardization Program Plan and HEDRS, as well as a systems/equipment selection process in which standardization is one of several key evaluation criteria for optimizing ship performance and cost.

LPD 17 design is near completion, but full provisioning and engineering documentation is not complete. Nonetheless, the equipment status for the LPD 17 is documented at 71 percent fleet standard and 29 percent nonstandard for contractor-furnished equipment, which excludes software, but includes HM&E equipment and some electronic equipment.

Conclusions

Lessons learned in the HM&E standardization program include:

- Unless accompanied by standardization incentives, acquisition of components as contractor-furnished equipment using performance-type specifications may result in unintended consequences: non-standardization and proliferation of like items.
- Monetary incentives are insufficient in supporting equipment decisions. To make the right equipment decisions, the program and design team must have access to equipment data.

- Communities must raise the awareness of the impacts on logistics support costs of using non-standard equipment. Engineers and managers should have easy access to standardization policies, data, and templates.
- Smart standardization can dramatically reduce total ownership cost (TOC) while improving performance, readiness, and interoperability. Standardization also reduces program risks of diminishing manufacturing sources and obsolescence.

Although empirical data on the overall life-cycle cost savings and benefits attributed to standardization on the LHD and LPD ship classes do not exist, we can translate standardization results into savings by considering the initial and life-cycle costs associated with the introduction of a new item into the logistics support system.

Although positive results have been achieved as evidenced by the LHD and LPD studies, the matter still requires attention.

According to FY02 data, the Navy supports nearly 150,000 unique HM&E components—down 30,000 from 1988—representing $15 billion in government assets. Still, almost 19 percent of HM&E equipment was installed in a single fleet application (one-of-a-kind occurrence within the fleet), costing the fleet approximately $5 billion in integrated logistics support.

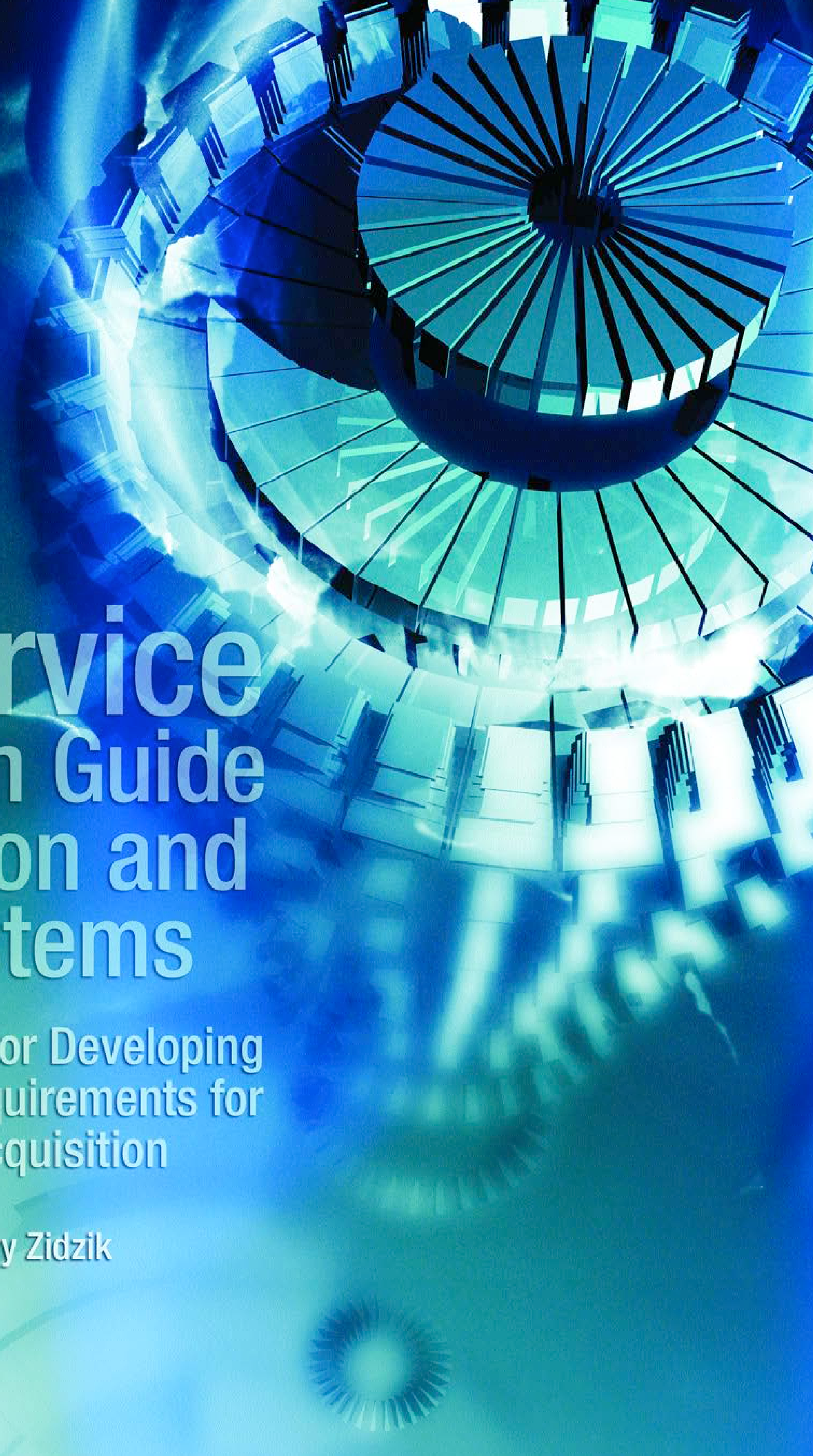
Using the ILS cost algorithm—assuming a conservative five-year equipment life, calculating the average ILS cost for the initial introduction of a new equipment across all HM&E equipment categories—NAVSEA estimates that the ILS cost of introducing one new piece of equipment averages $193,555. Therefore, if the Navy introduces 2,000 fewer new HM&E equipment, it could save $387 million in life-cycle costs.

Navy managers, faced with the need to reduce operating and life-cycle costs, are now required to select systems, equipment, and components based on TOC, rather than initial acquisition cost alone. Although initial acquisition cost remains important, additional life-cycle factors such as manning, reliability, maintainability, and availability must be considered to achieve the lowest practicable TOC. Standardization can result in significant reductions in the number of repairable items. Combined with the deliberate use of common items in ship design, standardization can produce substantial cost savings over a ship's life cycle.

To request access to HEDRS, please go to the Products section of NAVSEALOGCEN's homepage, www.nslc.navsea.navy.mil, select HEDRS and complete the online registration form. Access to HEDRS is limited to government employees and contractors under current contract to the government and for whom the contracting officer representative validates the request. All data contained in HEDRS is unclassified and For Official Use Only.

About the Authors

Keith Doyne has been with the Naval Sea Logistics Center and involved with the standardization program since 1990. Dan Martinez has been a Navy logistician for 24 years and has supported the standardization program and the Naval Sea Logistics Center for over 10 years.



Joint Service Specification Guide for Propulsion and Power Systems

A Common Framework for Developing Performance-Based Requirements for Aviation-Related Acquisition

By John Fisher and Mary Zidzik

In the wake of the widespread acquisition reforms and the mass cancellations and conversions of Mil-Specs and MilStds in the mid-1990s, a series of Joint Service Specification Guides (JSSGs) was conceived. The JSSGs identify generic performance-based requirements for a variety of Navy, Marine Corps, Air Force, and Army aviation roles and missions. Those requirements provide a solid starting point for developing a specification and other program documents tailored to a specific aviation-related acquisition. The JSSGs also provide a repository for lessons learned and corporate knowledge across all of the military services to help document what has been successful in past programs and practices. The JSSGs are intended for use by both government and industry personnel.

The fundamental objectives of JSSGs are to provide consistent organization and content guidance for describing requirements as

- meaningful in terms of meeting operational needs;
- performance-based without specifying the design;
- measurable during design, development, and verification; and
- achievable in terms of performance.

As shown in the specification tree (Figure 1), the JSSG suite has been created as a three-tiered framework:

- Tier I, Air System JSSG
- Tier II, Air Vehicle JSSG
- Tier III, aviation subsystems JSSGs (Engine JSSG, Avionics JSSG, etc.).

Each lower-tier document represents a flow-down of requirements established at the next higher tier to help ensure that a complete set of requirements can be generated for each program-unique specification. A systems engineering approach is emphasized to ensure a complete, integrated, and balanced solution, and accounts for all inputs and outputs. The upfront integration of requirements helps ensure a complete product definition and enables a disciplined top-down flow of requirements to lower-tier specifications.

Each JSSG has six sections: scope, applicable documents, performance requirements, verification criteria, packaging, and notes. The individual requirements are written as generic templates and may contain blanks, tables, and figures in lieu of numerical requirements, along with rationale and guidance to help tailor each requirement to program-specific needs. If a particular JSSG requirement is outside the scope of a program's needs, it can simply be omitted from the program specification. In an effort to capture the vast reservoir of experience gained from past DoD acquisition programs, each JSSG requirement contains both positive and negative lessons learned that apply to that particular requirement. In addition, sample verification methods and lessons learned during previous verifications of similar requirements are included for reference, along with final verification criteria to help ensure that the requirement has been fulfilled. This verification information is not intended to limit new practices, processes, methods, or tools, but rather to serve as a starting point for a program team to consider when determining the technical maturity of a requirement.

JSSGs are chartered by the Aviation Engineering Board of the Joint Aeronautical Commanders' Group, with active support from the Aeronautical Industries Association. Each of the Service Acquisition Executives has issued letters encouraging program teams to use JSSGs in development of program performance-oriented specifications.

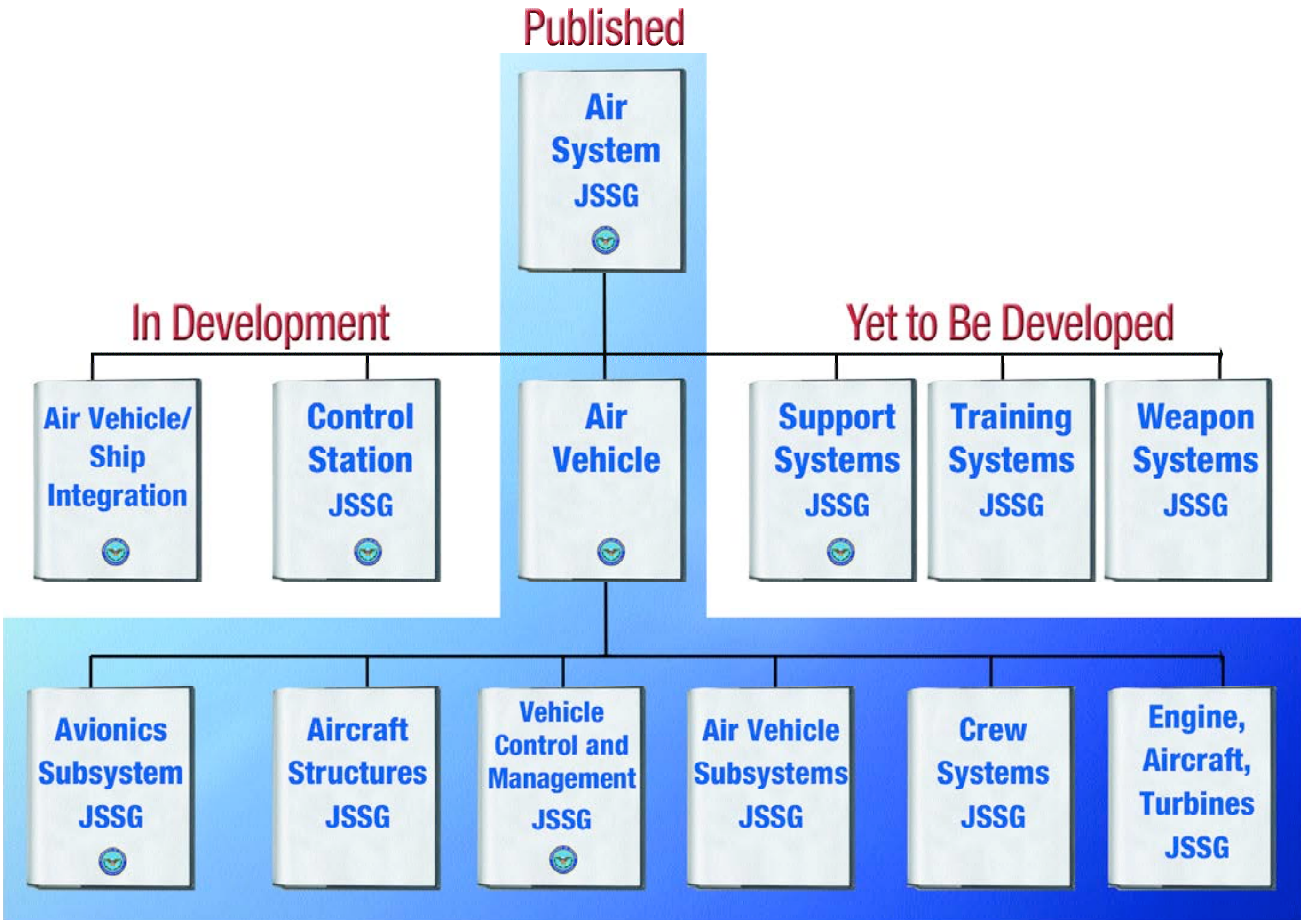


FIGURE 1. The JSSG Specification Tree.

JSSGs are tools not only for developing a program-unique specification, but also for facilitating communication between government and industry engineering communities. Where feasible, common terms and methods have been used, and service-unique language has been minimized.

The JSSGs are intended for common use among the services, and each has been developed through a concerted joint Navy, Air Force, and Army effort. Industry, under the auspices of the Aerospace Industries Association (AIA), also has participated in the development of JSSGs. The involvement of a wide variety of personnel has resulted not only in a set of requirements that covers all three services, but a means to facilitate joint programs by providing a single face to industry for common requirements as well. (Existing JSSGs can be found on the Acquisition Streamlining and Standardization Information System [ASSIST] website at assist.daps.dla.mil/.)

Throughout the initial creation and update of the JSSGs, perhaps the most active and dedicated work on the JSSG suite thus far has come from the team that compiled the Aircraft Turbine Engines JSSG (JSSG-2007). Over the past 8 years, a hard-working and highly focused group of government and industry technical experts has put together a thorough and comprehensive set of propulsion-related requirements. In addition to Navy, Air Force, and Army participants, the team has included AIA representation from Bell Helicopter, Boeing, General Electric, Lockheed Martin, Pratt & Whitney, and Rolls Royce. The current JSSG-2007 Team is chaired by John Fisher, who is also the USAF service lead. Mary Zidzik (NAVAIR) and John Woracek (Aviation and Missile Research, Development and Engineering Center) are the Navy and Army service leads, respectively. William Deskin (Pratt & Whitney and AIA propulsion subcommittee chairman) is the industry lead.

JSSG-2007 has three parts:

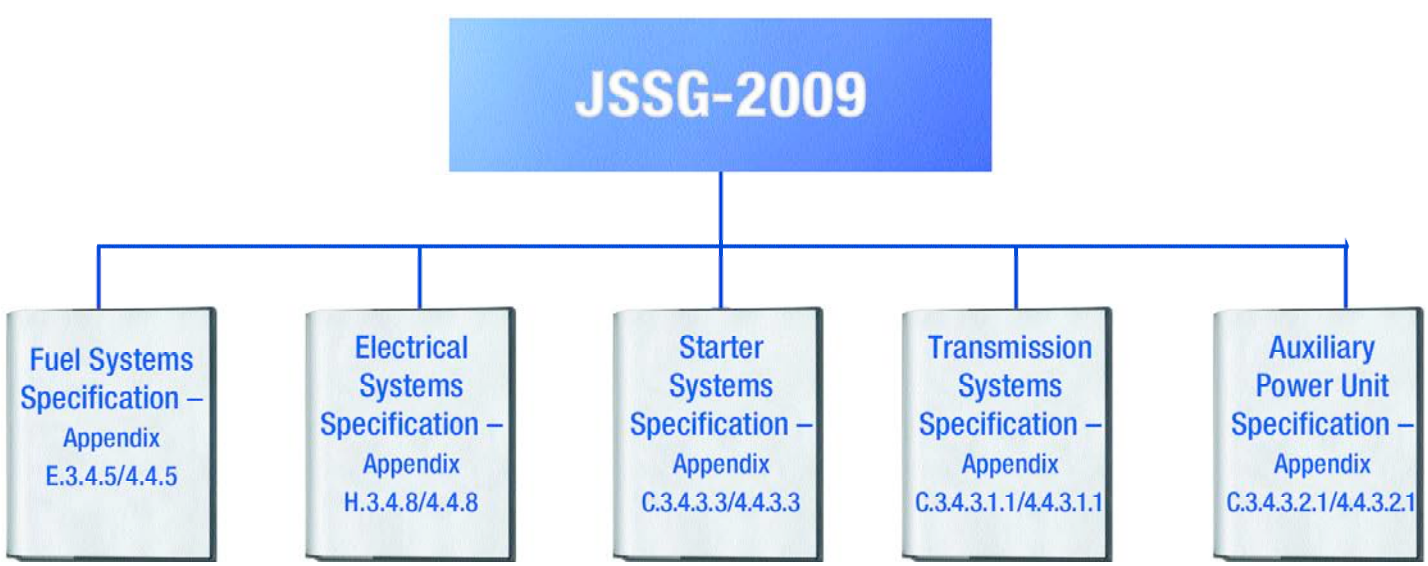
- Part 1 is the main document; it provides a set of design and verification requirements, in template format, for developing a program-unique performance specification.
- Appendix A is a handbook that provides the rationale, guidance, and lessons learned relative to each statement in Part 1.
- Appendix B is a handbook that provides rationale, guidance, and lessons learned to help establish an engine model specification for the production phase of the engine program. For each requirement, guidance is provided to assist the specification developer with tailoring a verification to reflect an understanding of the design solution, the identified program milestones, the associated level of maturity expected at those milestones, and the specific approach to be used in the design and verification of the required products and processes.

Different program applications require different levels of requirements. Manned systems often will include additional requirements having to do with aircrew safety and survivability, whereas an unmanned system will not. Likewise, rotary wing systems have unique components and subsystems not found on fixed wing applications, and wide body systems (cargo, tanker, transport) usually have more benign missions than fighters. Through careful tailoring of requirements and associated verifications, JSSG-2007A, the newest version of the Engine JSSG, can be used to develop a comprehensive, performance-based engine specification for any air system application. With increased DoD emphasis on the development of unmanned air vehicle (UAV) and unmanned combat air vehicle (UCAV) weapons systems, the propulsion requirements contained in JSSG-2007A can be tailored for high-value UAVs (such as Global Hawk) and UCAVs.

The requirements in JSSG-2007 are closely associated with the requirements found in JSSG-2009, Air Vehicle Subsystems, and should be considered in tandem with any engine requirements. Figure 2 depicts engine-related portions of JSSG-2009.

Since the initial publication of JSSG-2007 on October 30, 1998, the team has conducted an extensive update to ensure that the document is kept current in regard to aviation propulsion methods and developments. JSSG-2007A was released to the ASSIST database on January 29, 2004. Updates include the latest DoD Instruction 5000.2 policy for spiral development as applied to incremental verification. (See Table 1.) The JSSG team also added qualification guidance based on the latest Federal Aviation Administration regulations and advisory circulars and Joint Aviation Authorities Joint Aviation Regu-

FIGURE 2. Engine-Related Portions of JSSG-2009.



lations, including international requirements for UAVs and for military qualification of commercial applications. The services and industry can use this table to develop the verification matrix for all the design requirements in the JSSG-2007A for a specific application. Verification methods recommended for individual requirements may include analyses, modeling and simulations, component development tests, ground-level engine tests, flight tests, inspections, demonstrations, and so on.

The JSSGs are maintained by the services, with data calls to propulsion and power engineers requesting them to provide program-specific lessons learned—about technical advancements in instrumentation, verification techniques, technology, and so on—to maintain a useful reference for retaining corporate knowledge and training new engineers. Integrated program teams throughout government and industry provide a vital link in the JSSG update and maintenance process by providing rationale, guidance, and lessons learned for new requirements and by maintaining the existing guidance for use by future engineers.

Development of the JSSG suite continues. Current documents are being updated to ensure that a complete set of potential requirements is represented in light of changing user needs and that lessons learned are being added to reflect relevant experiences. In addition, two new JSSGs are being worked on, and others are being considered.

About the Authors

John Fisher is the technical expert for propulsion controls and subsystems at the Aeronautical Systems Center, Wright-Patterson Air Force Base, Dayton, OH. He has spent the last 19 years working on the development and field support of propulsion controls and subsystems for such aircraft as the F-15, F-16, F-22, F-35, B-2, and U-2, as well as various tanker, cargo, and trainer systems.

Mary Zidzik, the Navy lead for JSSG-2007A, works at the Naval Air Warfare Center, Aircraft Division, Patuxent River, MD. For the last 10 years, in addition to working on the Engine JSSG and Engine Health of Fleet metrics, she has provided program specifications support for the Joint Strike Fighter, F/A-18, T-45, Deepwater, Marine Corps Heavy Lift Replacement, Joint Unmanned Combat Air System, VXX, and other Naval Air Systems Command programs.

Comments, questions, or suggestions regarding JSSG-2007A may be directed to the following people:

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Mary Zidzik AIR-4.4.7	Phone: 301-757-0509	E-mail: Mary.Zidzik@navy.mil

TABLE 1. JSSG-2007 Spiral Development Matrix (To be completed by the specification developer; entries re p resent a sample guidance.)

Reqt. no.	Reqt. title	Concept refinement	Technology development	System development	Production and deployment	Operations and support
4-Mar	**Verification and qualification (title)**	**Spiral 1, 2, … (see tables XLVIII and XLIX)**	**Spiral 1, 2, … (see tables XLIX and L)**	**Spiral 2, 3, … (see table XXXIb)**	**Spiral 3, 4, … (see table XXXIb)**	**Spiral 4, 5, …**
3/4.1	Design and construction					
3/4.1.1	Item and interface					
3/4.1.1.1	Interface and installation					
3/4.1.1.2	Installation hardware					
3/4.1.1.3	Interface loads					
3/4.1.1.4	Mounts (title)					
3/4.1.1.4.1	Main mounts					
3/4.1.1.4.2	Ground handling mounts					
3/4.1.1.4.3	Engine stiffness					
3/4.1.1.5	Control lever and signals (title)					
3/4.1.1.5.1	Power lever and signal					
3/4.1.1.5.2	Load demand command and signal					
3/4.1.1.5.3	Output speed lever and signal					
3/4.1.1.5.4	Fuel shutoff lever and signal					
3/4.1.1.5.5	Lever torque					
3/4.1.1.6	Subsystem					
3/4.1.1.7	Bleed air					
3/4.1.1.7.1	Customer bleed air contamination					

Bringing Standardization to the World of Discrepancy Reporting for Naval Aviation

By Jim Zidzik and John Stoneham

Reengineering the naval aviation discrepancy reporting process has resolved a myriad of issues.

Who You Gonna Call…?

When the television you recently bought from the electronics store fails to work as advertised, what can you do to get satisfaction? In most cases, a trip back to the store for a replacement, repair, or reimbursement is a fairly simple task (depending on the size of the television of course). But what do you do if you have problems with your carrier-based attack jet or perhaps a cluster munitions pod? If you work in the U.S. naval aviation community, you'll be sending in a Naval Aviation Maintenance Discrepancy Reporting Program (NAMDRP) submission to get the issue resolved. Each year, some 7,000 sailors, civilians, and contractors submit, investigate, and resolve more than 15,000 naval aviation discrepancy reports.

NAMDRP's mission is to provide a means for the timely identification and reporting of naval aviation material deficiencies and for the facilitation of root cause analysis and corrective action. A primary NAMDRP goal is to ensure that every safety deficiency is promptly investigated and resolved. The eight NAMDRP reports address a broad range of issues such as substandard workmanship, premature part failure, and technical publication inaccuracies. Because of the diverse topics they cover, each report has unique submission data requirements, as well as a unique format, recipient identification, and workflow. Some reports require a part to be shipped from the fleet to a shore-based individual for investigation, while others do not. Even though the Naval Aviation Maintenance Program (NAMP) provides standards for the NAMDRP reports, many aircraft and weapons programs have developed unique processes within the overall NAMP standards to accomplish their specific program goals. Even more complexity is added when the discrepancy reporting process crosses the boundaries of naval aviation into other DoD components.

The lack of standardization in the discrepancy process led to unacceptable turnaround times, excessive shipping time or loss of parts in transit, and insufficient data available for trend analysis. In many cases, the submitting unit personnel, on 3-year rotations, were transferred before any resolution to their issue was published. Materials being shipped to organizations for investigation and problem resolution were often lost because of inconsistent documentation and non-standard handling procedures, precluding the analysis or resolution of root causes. The lack of standard data requirements on the submission of reports frequently led to incomplete or failed analysis of reported issues, thus no corrective action was possible to prevent reoccurrence. The end result of this lack of standardization was a discrepancy reporting process with serious issues and little fleet confidence. Although the fleet certainly knew whom to call with their problems, they were not at all certain that calling would do any good.

The Challenge of Standardization

To address the issues with discrepancy reporting, the Naval Air Systems Command embarked on an effort to reengineer the naval aviation discrepancy reporting process. The goals were

- to improve fleet confidence and usage,
- improve the performance of the individual reports, and
- integrate the reports in such a way as to gain greater insight across all naval aviation discrepancies.

Almost immediately, during NAMDRP development, the age-old conflict between standardization and individual needs became a problem. Most of the large aviation programs had processes involving extensive engineering and logistics support that the smaller programs lacked. The smaller programs often had contracts in place that passed discrepancies back to the contractor for repair or replacement, so the standard workflow steps of the larger programs didn't add a lot of value to the processes of the smaller contractor-based programs.

Unfortunately, allowing excessive process complexity to meet every need would increase development and support costs and would hamper integration of process metrics. Yet failing to adequately address customer needs risked creating an unpopular and unused system. By far the most difficult part of the construction of a common solution was finding the optimum balance between gaining the efficiencies of a standard process and maintaining the freedom for individual organizations to do business in the most effective way. To find the right balance, the NAMDRP reengineering team wrestled with several key questions:

- How much reengineering is possible given funding, schedule, and legal constraints?
- How much is enough?
- How can the workflow of any given report be optimized for the wide range of programs and situations it serves?
- How can the reengineered discrepancy reporting system reach across other Navy communities and other DoD components to serve greater needs?

To answer these questions, the team needed significant input from the areas to be reengineered. But reengineering projects often create organizational push-back, because reengineering involves remaking the rules. And although never directly mentioned, the participants' perception of winning and losing played a huge part in what was possible.[1]

The reengineering team tried to address those issues in three ways:

- First, the team stayed focused on the customer with a set of defining principles that provided guidelines and boundaries for the many process negotiations.

Types of Discrepancy Reports

Engineering Investigations (EI)
- Determine cause and depth of fleet-reported material failures

Hazardous Material Report (HMR)
- Malfunction/failure that could result in death/injury, loss of aircraft/equipment/facilities

Product Quality Deficiency Report (PQDR)
- Deficiencies in new or newly reworked material

Technical Publications Deficiency Report (TPDR)
- Technical publication safety hazards and deficiencies

Aircraft Discrepancy Report (ADR)
- Substandard workmanship/repair in newly manufactured, modified, reworked aircraft

Conventional Ordnance Deficiency Report (CODR)
- Deficiencies in conventional ordnance, ammunition, explosives

Explosive Mishap Report (EMR)
- Explosive incidents or defects in explosive systems, launch devices, support equipment

Baseline Trouble Report (BTR)
- Aircraft baseline discrepancies (delivered equipment not to baseline configuration requirements)

Reeingineering Guiding Principles

One-Stop-Shopping for the Fleet

- Same site, look, and feel regardless of report

Shift the Burden from the Fleet to NAVAIR

- Ease of entry, initiation, shipping, and status

Be Customer Driven

- Fleet needs first

Be Reliable and Accessible 24/7

- Toll-free clearinghouse and "help desk"

Utilize Best Business Practices

- Commercial best processes

Provide Transaction-Based Metrics

- Fleet user and NAVAIR management

Provide Positive Material Control

- Shipping, tracking, receipt acknowledgment, and material disposition

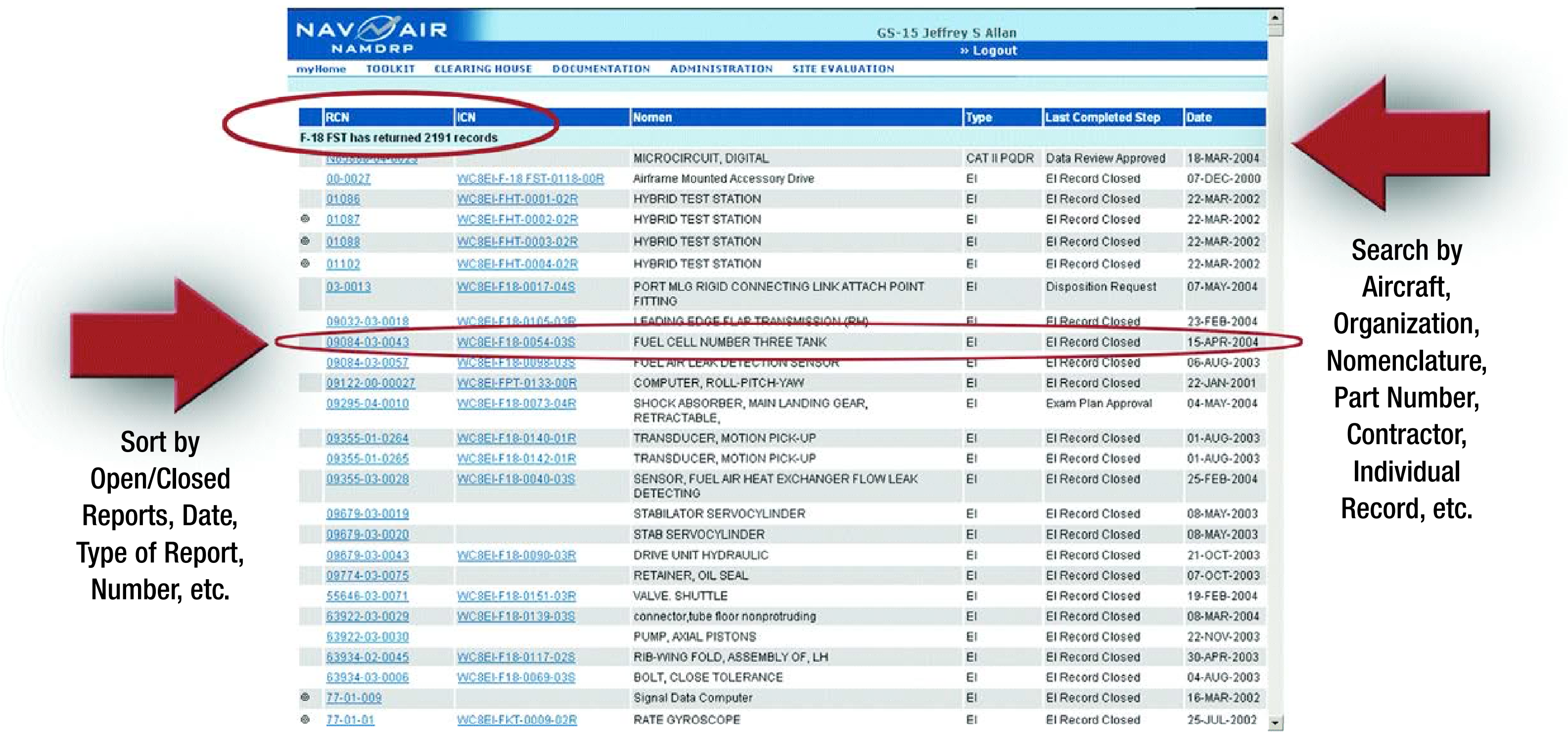
- Second, the team worked closely with the management and subject matter experts to fully integrate team members across organizational boundaries.
- Third, the team ensured that the owners of the various discrepancy reports maintained a prominent role during the reengineering of their respective reports.

Although organizational issues were significant, technology also played a large role in reengineering the NAMDRP reports. The team leveraged technology to find the optimum balance between standardization and accommodating unique process needs. Connecting, but not replacing, existing IT platforms was a key component to finding that balance. The key elements were data compatibility and the identification of authoritative sources of discrepancy data. As the IT industry well knows, this was no easy task, because each of the systems to be joined was not originally designed to be compatible with other systems.

The NAMDRP team, recognizing that all the reports had certain common characteristics, developed a "tool box" of web-based tools that could be easily adapted and applied to each report's unique requirements. For all their differences, each report needs to accommodate three basic phases of activity: submission, analysis, and resolution. The typical submitter is a Navy sailor or Marine that identifies an undesirable condition in the squadron and reports the details of the situation. The report is then analyzed by individuals with the skills appropriate to the report type. Once the analysis of the deficiency is complete and the root cause identified, corrective actions are identified and taken to resolve the problem, as well as any issues needed to prevent the reoccurrence of the deficiency. Common web tools were developed to optimize the similar functionality of each phase and allow for the most efficient workflow throughout the processes. The ability to attach various types of media such as pictures or video to aid in analysis, addition of automated e-mail prompters, and user status visibility throughout the workflow of each report also leveraged technology to vastly improve the flow of communication using these common tools.

What Worked

Many factors contributed to the outstanding success of this now ongoing program. The top three that truly leveraged that success were



RCN	ICN	Nomen	Type	Last Completed Step	Date
[illegible]		MICROCIRCUIT, DIGITAL	CAT II PQDR	Data Review Approved	18-MAR-2004
00-0027	WC8EI-F-18 FST-0118-00R	Airframe Mounted Accessory Drive	EI	EI Record Closed	07-DEC-2000
01086	WC8EI-FHT-0001-02R	HYBRID TEST STATION	EI	EI Record Closed	22-MAR-2002
01087	WC8EI-FHT-0002-02R	HYBRID TEST STATION	EI	EI Record Closed	22-MAR-2002
01088	WC8EI-FHT-0003-02R	HYBRID TEST STATION	EI	EI Record Closed	22-MAR-2002
01102	WC8EI-FHT-0004-02R	HYBRID TEST STATION	EI	EI Record Closed	22-MAR-2002
03-0013	WC8EI-F18-0017-04S	PORT MLG RIGID CONNECTING LINK ATTACH POINT FITTING	EI	Disposition Request	07-MAY-2004
09032-03-0018	WC8EI-F18-0105-03R	LEADING EDGE FLAP TRANSMISSION (RH)	EI	EI Record Closed	23-FEB-2004
09084-03-0043	WC8EI-F18-0054-03S	FUEL CELL NUMBER THREE TANK	EI	EI Record Closed	15-APR-2004
09084-03-0057	WC8EI-F18-0098-03S	FUEL AIR LEAK DETECTION SENSOR	EI	EI Record Closed	06-AUG-2003
09122-00-00027	WC8EI-FPT-0133-00R	COMPUTER, ROLL-PITCH-YAW	EI	EI Record Closed	22-JAN-2001
09295-04-0010	WC8EI-F18-0073-04R	SHOCK ABSORBER, MAIN LANDING GEAR, RETRACTABLE,	EI	Exam Plan Approval	04-MAY-2004
09355-01-0264	WC8EI-F18-0140-01R	TRANSDUCER, MOTION PICK-UP	EI	EI Record Closed	01-AUG-2003
09355-01-0265	WC8EI-F18-0142-01R	TRANSDUCER, MOTION PICK-UP	EI	EI Record Closed	01-AUG-2003
09355-03-0028	WC8EI-F18-0040-03S	SENSOR, FUEL AIR HEAT EXCHANGER FLOW LEAK DETECTING	EI	EI Record Closed	25-FEB-2004
09679-03-0019		STABILATOR SERVOCYLINDER	EI	EI Record Closed	08-MAY-2003
09679-03-0020		STAB SERVOCYLINDER	EI	EI Record Closed	08-MAY-2003
09679-03-0043	WC8EI-F18-0090-03R	DRIVE UNIT HYDRAULIC	EI	EI Record Closed	21-OCT-2003
09774-03-0075		RETAINER, OIL SEAL	EI	EI Record Closed	07-OCT-2003
55646-03-0071	WC8EI-F18-0151-03R	VALVE. SHUTTLE	EI	EI Record Closed	19-FEB-2004
63922-03-0029	WC8EI-F18-0139-03S	connector,tube floor nonprotruding	EI	EI Record Closed	08-MAR-2004
63922-03-0030		PUMP, AXIAL PISTONS	EI	EI Record Closed	22-NOV-2003
63934-02-0045	WC8EI-F18-0117-02S	RIB-WING FOLD, ASSEMBLY OF, LH	EI	EI Record Closed	30-APR-2003
63934-03-0006	WC8EI-F18-0069-03S	BOLT, CLOSE TOLERANCE	EI	EI Record Closed	04-AUG-2003
77-01-009		Signal Data Computer	EI	EI Record Closed	16-MAR-2002
77-01-01	WC8EI-FKT-0009-02R	RATE GYROSCOPE	EI	EI Record Closed	25-JUL-2002

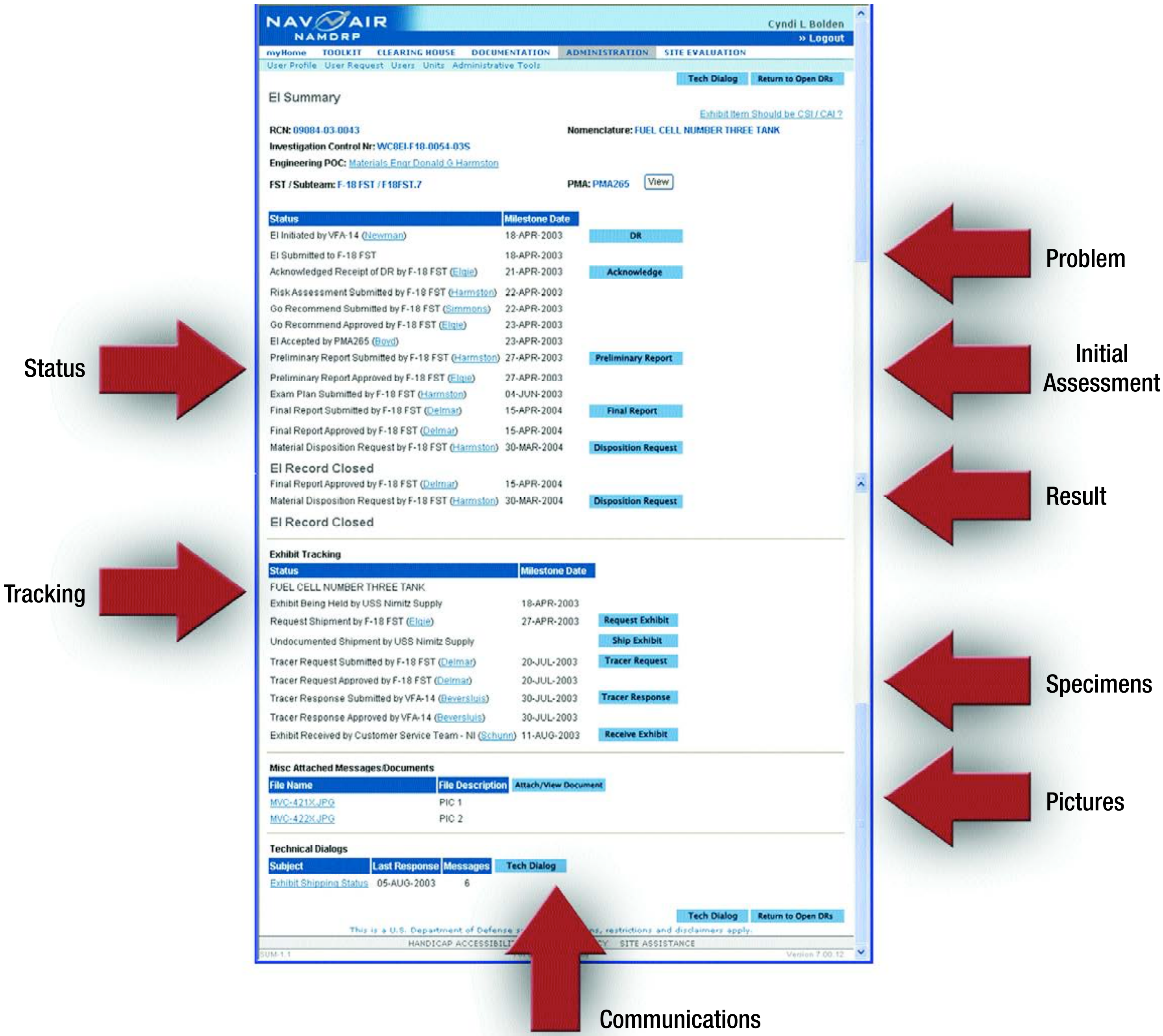
Discrepancy Report Search and Sort Capabilities

commitment by senior leadership, relentless focus on customer feedback, and design of a common look and feel for all the reports.

This project had extraordinary levels of very senior support throughout its development, and that made all the difference. Although extremely hard to come by, the resources both in terms of outstanding personnel talent and project funding were made available when needed to create the best process and technical solutions. This project was also given the latitude and encouragement to change the process and governing instructions as necessary to meet the needs of the warfighter. Add to this the personal commitment at the highest levels to overcome the cultural barriers, and the reasons for success start to become clear.

Positive user feedback was the backbone of long-term support. The fact that we received consistent positive fleet feedback after each phase of implementation, and then continued to receive fleet requests for further development, led to the sustained support for this project even after the initial commitments were beginning to fade.

Several solution design factors also had a significant role in the benefits of increased standardization. Creating a single consistent website interface with a common look and feel eliminated fleet confusion and frustration with multiple report formats and unique submission requirements. The adoption of a common commercial shipping interface to print waybill, track part shipment, and automate e-mail communication between senders and recipients drastically reduced parts loss due to shipping miscommunication. Establishing a single authoritative staff of clearinghouse personnel available round-the-clock to resolve user questions, to identify reports lost in the workflow, and to provide ad hoc system metrics boosted user confidence in the new processes and provided much needed consistency in execution of each process workflow.



What We Learned

Looking back for lessons learned, the team consistently underestimated the effort required to reengineer each subsequent report. In general, the team worked on the reports in series, and there was a great temptation to assume that each successive report would be easier to reengineer than the last. After completing the first report, estimates for the remaining reports were based on a percentage of the first report, and all estimates were less than 100 percent. This proved to be a very poor assumption. Each report had its own unique set of requirements, and the team did not understand those requirements until subject matter experts for that report were brought onboard. Once the experts were available and the organizational barriers were lowered to the point where an accurate analysis of the new report could be conducted, the true complexity of the report emerged. Thus, scope and schedule requirements were forced to change.

Looking Ahead

Turnabout is fair play as they say. So it isn't surprising to find that just as this project looked to improve or replace nonstandard discrepancy processes and systems, it will become our turn to be replaced by efforts to further increase defense standardization. The Navy's eventual full-scale implementation of an enterprise resource planning (ERP) information system will add yet another level of process consistency across the Navy and DoD. Likewise, the Navy Marine Corps Intranet (NMCI) program is attempting to bring new levels of technological standardization to the Navy world, and these changes never cease to be a challenge. The biggest challenge, however, will remain finding that optimum balance between standardization and mission accomplishment and to help ERP and NMCI find that balance as their systems develop and mature to serve in the years to come.

[1]People often described NAMDRP as a website development project and assumed that developing the code was the most difficult and challenging part of the project. In fact, the cultural aspects of the project were far more difficult and time-consuming than the IT issues. The pace of organizational change experienced by DoD components over the last two decades has made many weary of change and highly suspicious of outsiders who are "only trying to help." As a result, gaining not just willing but enthusiastic participation and support across department and component lines took much longer than anticipated.

About the Authors

Jim Zidzik is the NAMDRP program manager. He works in the Systems Engineering Department, Naval Air Systems Command, at Naval Air Station, Patuxent River, MD. Jim has been with the Navy for nearly 30 years and specializes in air-breathing propulsion.

John Stoneham is the deputy program manager for NAMDRP, with 8 years of experience in systems integration and software development.

Naval Aviation Critical Safety Items

Designed Right, Built Right, Installed Right, Maintained Right, Supported Right—First Time and Every Time

By Ed Auger and Tom Broadhurst

Safety has always been of paramount concern among aircrews and the dedicated personnel who maintain our Navy and Marine Corps aircraft. However, their safety efforts are focused primarily on day-to-day training and operating procedures; on ways to deal with constantly changing physical environments; and on daily preparation, operation, and preventive maintenance of airframes, engines, and support equipment. In short, their efforts are focused on getting the mission done safely. There is an implicit trust among fleet personnel that the parts for the upkeep and repair of their aircraft are sound and can be trusted to safely perform their intended function. Not until a failure or mishap involving serious personnel injury or equipment damage occurs does the question of suspect parts become a fleet operator issue. This article discusses the background and status of recent actions to improve the life-cycle management of aviation critical safety items (CSIs).

The day-to-day concerns about the safety of the items used in aircraft have traditionally been the collective concern of the engineers who design, analyze, and qualify the parts; the manufacturers who make the parts; the inspectors who check quality; the maintainers who install or repair the parts and aircraft; and the supply chain managers who procure and manage those items for fleet use. To be effective, there must be a consistent understanding on the parts that have safety implications, characteristics and manufacturing processes that are of greatest concern, suppliers that have proven their ability to consistently manufacture the items, quality assurance expectations of the contractor and the government, documentation requirements, and disposal procedures. All government and industry organizations must use standardized terms, definitions, criteria, and processes. A failure in any one aspect could result in receipt of defective parts with potential catastrophic consequences.

The past two decades have seen a myriad of initiatives with good intentions that also had unintended consequences:

- The Competition in Contracting Act of 1984 established a mandate for maximizing competition in the procurement process and placed constraints on establishing supplier qualification requirements. This occasionally resulted in contract awards to suppliers who had not demonstrated their ability to consistently produce satisfactory parts.
- DoD actions to standardize, streamline, and combine acquisition of spare and repair parts resulted in aviation safety-related items being purchased by organizations other than those having direct knowledge of the item's design intent, criticality, limitations, and critical design or manufacturing characteristics.
- Rules governing specifications and standards were significantly revised, giving contractors greater latitude to decide how to achieve desired performance objectives. Unfortunately, not all contractors had knowledge

about an item's application, design intent, or failure implications.

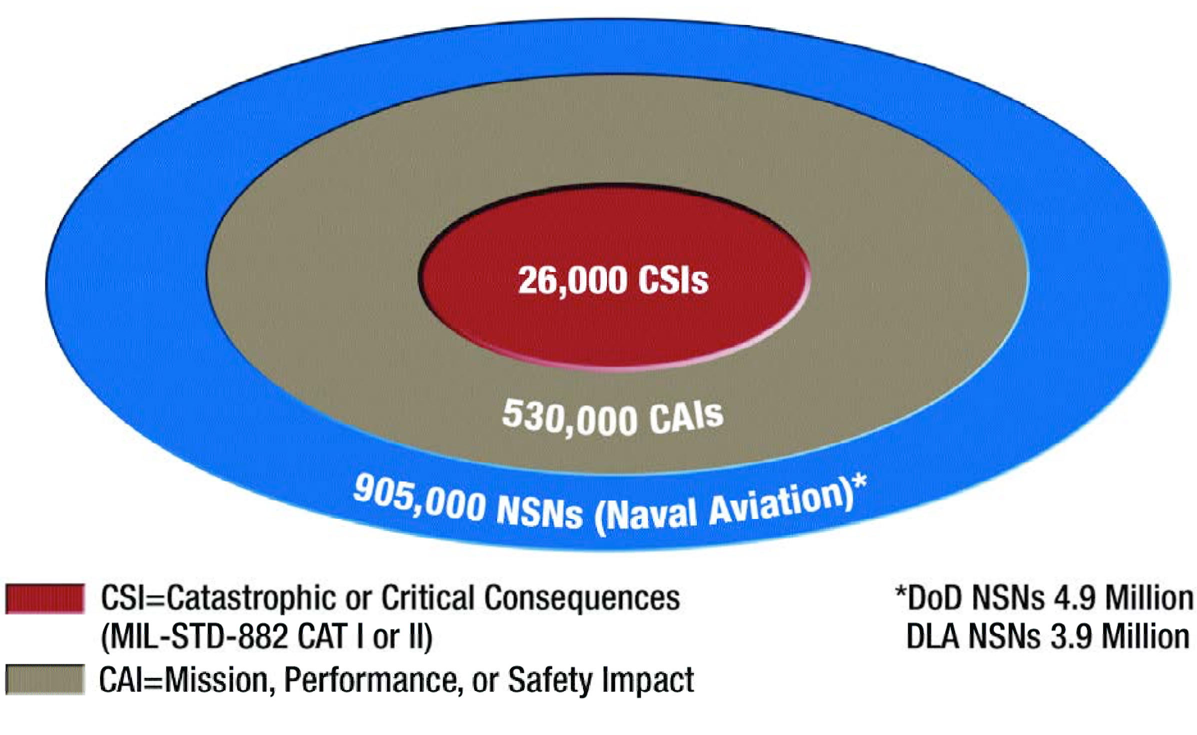
- The 1996 repeal of legislative language on the procurement of critical aircraft spare parts (United States Code, Title 10, Section 2383) was intended to help DoD shift from military specifications to best industry practice, but it also eliminated statutory coverage requiring new sources for CSIs to meet the same, or comparable, qualification requirements as the original equipment manufacturer (OEM).
- DoD downsizing and base realignment had the desired effect of reducing infrastructure, but it created gaps in engineering and quality assurance coverage.

In the vast majority of cases, these initiatives achieved their intended objectives of improved efficiency and lower costs, and the unintended consequences were not severe. However, "in the vast majority" is not an acceptable concept when unintended consequences could result in loss of life, permanent disability, loss of aircraft, or significant equipment damage. Aviation CSIs must be built and managed right the first time and every time.

As shown in Figure 1, CSIs represent only a small percentage of the total number of parts in the supply system. And of all parts used in naval aviation systems, less than 5 percent are CSIs. However, the consequences of failure demand rigorous evaluation and oversight of CSI design and manufacturing processes to ensure that safe and reliable parts can be repeatedly produced.

Before 2002, the responsibility for identifying aviation CSIs and for managing the parts was spread unclearly among aircraft manufacturers, OEMs, and government engineering and supply organizations. What was clear was that the lack of standard processes resulted in unsafe situations. The fragmented management did not ensure that CSIs were properly identified as such or that key product attributes were properly defined. Oversight processes did not always ensure proper testing or quality assurance. Approval of "minor" nonconformances and design changes was incon-

FIGURE 1. Naval Aviation Critical Items.



sistently applied. Supplier qualification processes were inconsistent. One consequence was that, in 1999, the Naval Air Systems Command (NAVAIR) began experiencing a rash of nonconforming CSIs. Between 1999 and 2001, 18 bulletins were issued to remove and replace defective aviation CSIs that were procured without the necessary controls. Affected parts included those used in aircraft catapult and recovery systems, engines and transmission systems, flight controls, ejection seats, life support and escape systems, and other essential systems.

As a direct result of the quality issues, NAVAIR, the Naval Inventory Control Point (NAVICP) in Philadelphia, and the Defense Logistics Agency (DLA) began a comprehensive examination of the life-cycle processes used to identify, document, acquire, inspect, and dispose of aviation CSIs. This examination revealed that all of the organizations involved in the management of aviation CSIs contributed in some way to the quality problems. To remedy this situation, in June 2002, the Navy published a completely revised NAVAIR Instruction 4200.25D, "Management of Critical Application Items Including Critical Safety Items." This instruction standardized policies, processes, and responsibilities for naval aviation CSIs from the time the part is introduced into the supply system through to its disposal. Policies addressed the initial determination of item criticality; subsequent changes to this determination; coding and tracking requirements; the process for ensuring the adequacy of technical data and proposed changes to the data; approval of waivers, deviations, or changes to technical requirements; approval of sources of supply and repair/overhaul; authorities for one-time organic manufacture of critical items under exigent circumstances; and requirements for disposing of critical items.

While it was revising Navy policy, NAVAIR began working with other members of the Joint Aeronautical Commanders' Group (JACG) to standardize aviation CSI processes across the federal government. The JACG is a flag-level committee with representatives of the commanders of the military service aviation acquisition organizations, DLA, Defense Contract Management Agency (DCMA), NASA, Federal Aviation Administration, and Coast Guard. In August 2002, the JACG released standardized CSI guidance, terms, definitions, criteria, and process requirements to better ensure operational safety of aviation systems across DoD and civil agencies.

NAVAIR and the JACG undertook further action to reestablish statutory coverage for aviation CSIs. In November 2003, the National Defense Authorization Act for 2004 (Public Law 108-136, Section 802, "Quality Control in Procurement of Aviation Critical Safety Items and Related Services") reinstituted necessary statutory provisions to place responsibility for managing aviation CSIs with the military service design control activity (DCA). The act defines an aviation critical safety item as

> a part, an assembly, installation equipment, launch equipment, recovery equipment, or support equipment for an aircraft or aviation weapon system if the part, assembly, or equipment contains a characteristic any failure, malfunction, or absence of which could cause a catastrophic or critical failure resulting in the loss of or serious damage to the aircraft or weapon system, an unacceptable risk of personal injury or loss of life, or an uncommanded engine shutdown that jeopardizes safety.

It requires the Secretary of Defense to "prescribe in regulations a quality control policy for the procurement of aviation critical safety items and the procurement of modifications, repair, and overhaul of such items." The act further stipulates that the head of the DCA for aviation CSIs "establish processes to identify and manage the procurement, modification, repair, and overhaul of aviation critical safety items." It goes on to say

Issues	NAVAIRINST 4200.25D (6/02)	JACG CSI Guidance (8/02)	Numbered DoD-Wide Instruction (In Process 1/04)	DoD Regulation 4140.1-R (5/03)	DFARS Awaiting Release	P.L. 108-136 (FY04 Auth Act, Sec. 802, 11/03)	SECNAV INST 5000.2C (At Sig)
ID CSIs & Critical Characters	●	●	●	●	●	●	●
Qual Req'ts. App'd Sources & Reciprocity	●	●	●	●	●	●	
Acquisition & Log Processes	●	●	●	●	●	●	●
Surplus CSIs & Local Purchases	●	●	●	●	Local Purch		
1-Time Mfg & Reverse Eng	●	●	●		Rev Eng		
QA Req'ts (QALIs, FAT, PLT)	●	●	●	●			
Tech Changes (ECPs, W & Ds)	●	●	●	●	●		
Tech Directives (e.g. Bulletins)	●	●	●				
Disposal	●	●	●	●			
Management	●	●	●		●		
Notification of Safety/ Supplier Deficiencies			●				

FIGURE 2. Aviation Critical Safety Items: Policy, Regulation, and Statutory Initiatives.

that "the term DCA, with respect to an aviation critical safety item, means the systems command of a military department that is specifically responsible for ensuring the airworthiness of an aviation system or equipment in which the item is to be used." In the case of naval aviation, NAVAIR is the DCA. The act also requires that "the head of the contracting activity for an aviation critical safety item enter into a contract for the procurement, modification, repair, or overhaul of such item only with a source approved by the DCA" and that "the aviation critical safety items delivered, and the services performed with respect to aviation critical safety items, meet all technical and quality requirements specified by the DCA."

Several actions have been completed or are underway to institutionalize standardized management of aviation CSIs (see Figure 2). The revised DoD Supply Chain Materiel Management Regulation (DoD 4140.1-R) contains an updated Chapter C8.5 establishing policies on the DoD Aviation Critical Safety Items (CSIs)/Flight Safety Critical Aircraft Parts (FSCAP) Program. The recently revised SECNAVINST 5000.2C now includes Navy policy on managing aviation CSIs. A Defense Federal Acquisition Regulation Supplement case and interim rule has been released for public comment. In January 2004, the JACG refined its CSI guidance and requested that it be published as a formal, numbered multi-service/agency instruction. The draft instruction is now being coordinated at the Service Acquisition Executive and Director of DLA levels.

To provide working-level guidance on implementing the various policies, a DLA team of technical and procurement experts from NAVAIR, NAVICP, and DCMA has recently completed development of the *Critical Item Management Desktop Guide*. This guide outlines the overarching NAVAIR procedures for managing aviation critical items throughout their life cycle. It provides detailed, integrated, and standardized working-level procedures and processes to implement the intent of the various statutory, regulatory, and policy requirements.

Similarly, the JACG established a team to develop a DoD procedures handbook for CSIs. Still in the initial stages of development, the hand-

Inset shows arresting wire pin not heat-treated to provide proper strength.

book should provide a major steppingstone toward implementation of standard policies and processes to be used throughout DoD for the management and coordination of issues affecting CSIs. Defense supply chain management organizations, as well as prime contractors, OEMs, and vendors that support aviation CSIs should benefit from this effort through the standardization of DoD terminology, requirements, and processes to which they are required to respond.

NAVAIR (AIR-4.1C) is responsible for developing and managing aviation CSI policies, processes, training, reviews, and assessments. The authors welcome any comments or input regarding CSI management processes. They can be reached at edward.auger@navy.mil or tbroadhurst@erols.com.

About the Authors

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Battery Standardization at Crane Division, Naval Surface Warfare Center

By Brad Secrest

The Crane Division of the Naval Surface Warfare Center (NSWC) has a long history of providing design, engineering, and test support for electrochemical power systems (batteries and fuel cells) for many DoD weapons systems. In the late 1970s, NSWC Crane began to address power systems standardization. That initial effort carries through to today, where standardization is a daily consideration.

Organizational History

The Power Systems Division at NSWC Crane had its beginning in the late 1950s. Customers that needed electronic components tested asked for battery testing services as well. From those early beginnings, the organization has grown to nearly 100 people who provide services throughout the life cycle (except for research and development). The division has teaming agreements in place with other Navy power systems organizations such as NSWC Carderock Division and Naval Undersea Warfare Center Newport Division, as well as organizations in the Army, Air Force, and Defense Logistics Agency. Today, the Power Systems Division is involved in a broad range of systems, including submarines and submersibles, aircraft and avionics, ground support equipment, missiles, satellites, and other electronic devices. Customers come from every uniformed service, many government agencies, and private industry.

Military Batteries

In most commercial applications, a dead battery is merely an inconvenience; in military applications, it could be a matter of life or death. The military uses batteries ranging in size from small button cells to large batteries for launch facilities. Military batteries must operate in extreme environments with a high reliability. Missile batteries, for example, may hang on the wing of an aircraft, transition from the high temperatures on the flight line to the cold of high altitude in a matter of minutes, over and over for perhaps years. After exposure to this rigorous life, the battery must function when the missile is fired. Batteries for gun-launched weapons must survive accelerations on the order of 30,000 times the force of gravity and still perform their function. Designing a battery for military applications is challenging, and that fact drives the cost. Although many batteries cost a few hundred dollars or less, batteries for many applications cost thousands of dollars—and some cost tens of thousands of dollars.

The Standardization Issue

At one point, before NSWC Crane's past standardization efforts, more than 3,800 unique batteries were in the military procurement system. One factor driving this number was the diversity of systems used by the military. A battery designed to sit in a missile for 20 years then perform its function once is not much good for doing engine starts on an aircraft; nor would a 2,000-pound lead acid cell used in submarines be much use for gun-fired munitions. Another contributor was the acquisition process itself. When DoD acquired a new system, the battery was often specified and selected by the system designer and was optimized for that system. This approach fails to take advantage of possible system-level tradeoffs that would benefit by using an existing battery to lower the total ownership cost of the system.

Simple things such as standardizing a connector can have a significant impact on procurement quantities and support equipment needs.

Past Standardization Efforts

Beginning in 1979, NSWC Crane attacked this problem by replacing the many manufacturer-designed aircraft batteries with a standard family of government-designed, commercially procured batteries. In doing so, the latest technologies and materials were inserted into the fleet. By introducing these technologies, the maintenance and replacement intervals were significantly increased. Data gathered by the Defense Logistics Agency documented routine maintenance interval improvements varying from a factor of 3.4 to a factor of 44.1, and replacement interval improvements varying from a factor of 6 to a factor of 42.6.[1] Not only were reductions in battery maintenance actions and replacements noted, but so were procurement savings, varying from a factor of 2.1 to 10.9 and a cost avoidance in excess of $454 million.

Standardization Today

Standardization has become a way of life in the Power Systems Division at NSWC Crane, and it is spreading to DoD prime contractors and program offices. Often, the first question asked of Crane by system designers is "Can you find me an existing battery that will meet these requirements?" Efforts on aviation batteries continue with various customers. Simple things such as standardizing a connector can have a significant impact on procurement quantities and support equipment needs. With regard to missile batteries, standardization is much more challenging. Where every ounce can be directly correlated to flight time, range, and aerodynamic capability, it was once a hard sell to convince designers to use a battery not optimized for their system, even though a new development might run in the millions of dollars. Today, the trade-space for missile system design often includes alternative battery designs, and many designs are being reused for multiple systems.

Summary

As demonstrated by past efforts, standardization of militarily unique batteries can be very successful in reducing the total ownership cost of a weapon system. And in those areas where many thought standardization would not succeed, NSWC Crane has proven it possible.

[1]Defense Standardization Program, *Aircraft Batteries and Components: Design Improvements and Standardization Yield Savings and Reliability*, Case Study.

About the Author

Brad Secrest is the manager of the Rechargeable and Renewable Power Systems Branch at NSWC Crane. He has worked on both primary and rechargeable batteries and fuel cells for the past 20 years.

Industry-Managed QPL Program

A "Win-Win" Qualification Partnership

By Tom O'Mara

Background

Since the inception of flight, there has been a close relationship between military and civil aviation. The two communities grew up together, shared best practices, leapfrogged each other's technologies, and actively pursued transitioning aircraft, subsystems, equipment, parts, materials, and processes initially designed for one community and readily integrated into the other. Engineers supporting military and commercial aviation worked collaboratively to develop standards and specifications suitable for both environments. "Ownership" of standardization documents was of secondary concern; of primary interest were the technical requirements and verification processes contained within.

Military specifications and standards often were (and continue to be) de facto U.S. domestic and international aerospace standards. As evidence, in 1996, the Aerospace Industries Association (AIA) estimated that the military prepared about 20 percent of the specifications and standards used in the design of commercial wide-body aircraft. Similarly, the use of non-government standards (NGSs) was commonplace in military aircraft design. The AIA also estimated that about 13 percent of a tactical fighter aircraft's design standards came from industry associations or professional societies.

Although cooperation in standards development existed, industry had long complained about overly restrictive process standards, unique military requirements that lagged commercial practices, and excessive oversight requirements. As a result, when DoD's Acquisition Reform initiative began in 1994, military specifications and standards were the first target for change.

Elimination of cost-driving process standards and requirements was widely supported by defense contractors. What caught the aerospace industry by surprise, however, was the aggressiveness with which DoD began to cancel product specifications they viewed essential to civil and military aircraft design and certification. The March 1996 AIA newsletter decried the apparent wholesale cancellations of military specifications that defined parts and materials used in worldwide aircraft manufacture. The aerospace industry did not consider these parts and material specifications to be cost drivers. The article stated that military specifications defined as much as one-third of the parts used on most of the aircraft built throughout the world and had become de facto commercial specifications. In response to DoD's Acquisition Reform enthusiasm, AIA formed an Early Warning Project Group under its National Aerospace Standards Committee to maintain standardization, with all of its inherent cost and safety benefits, for aerospace parts and materials.

The Naval Air Systems Command (NAVAIR) had historically maintained a strong working relationship with the various non-government standards developing organizations (SDOs)—for example, AIA and the Society of Automotive Engineers (SAE)—involved with aircraft design, manufacturing, and maintenance. Of the nearly 4,500 active standardization documents managed by NAVAIR in 1994, 16 percent were adopted NGSs. Many NAVAIR-prepared military specifications were de facto industry standards.

Because of this, NAVAIR began a concerted effort with the Early Warning Project Group to migrate military standardization documents to NGSs. The objective was to ensure that technical requirements critical to military and civil aviation design be preserved. This collaboration was so successful that by 2004, approximately 43 percent of NAVAIR-managed standardization documents were NGSs.

The transition from military specifications to NGSs carries responsibilities. To ensure that military requirements continue to be supported, DoD engineers must participate with the various committees engaged in updating NGSs. They must be willing to contribute to the constant maintenance and improvement of the standards. DoD engineers must be willing to carry their fair share of the standardization workload along with their industry and academic counterparts.

Standards Alone Are Not Always Enough

Specifications and standards establish the technical requirements of needed parts, materials, or processes. They don't ensure that prospective manufacturers have the ability or integrity to consistently produce satisfactory products. Supplier site evaluations, documentation reviews, past performance assessments, inspections, and testing are required to assess supplier capabilities. These efforts are time-consuming and costly for both the supplier and the customer. Consequently, most organizations rely on time-based qualification processes for critical or expensive parts or where the time or equipment required to properly evaluate an item is extensive.

Qualification processes are independent of a specific procurement action. They serve to approve a supplier for an item or family of items over a period of time. To validate that suppliers haven't changed practices over time in a way that would affect product quality, periodic reassessments are performed. Although most major companies use similar processes, there is little approval reciprocity across industry. Each company typically establishes its own rules for evaluating suppliers, independently conducts supplier assessments, and maintains its own approval listings. The one area in which multiple organizations do accept a common source approval process and approved source listing is DoD's Qualified Products List (QPL) program.

At the onset of Acquisition Reform, no industry alternative qualification process existed. This posed a problem for the transformation of military specifications to NGSs. As a stopgap until a QPL alternative could be developed, military specifications with qualification requirements were deferred or qualification remained with DoD activities. DoD then began working closely with industry and a not-for-profit affiliate of SAE known as the Performance Review Institute (PRI) to establish a mutually acceptable, industry-managed QPL-like approach. PRI had experience in performing other industry assessments, accreditations, and certification services.

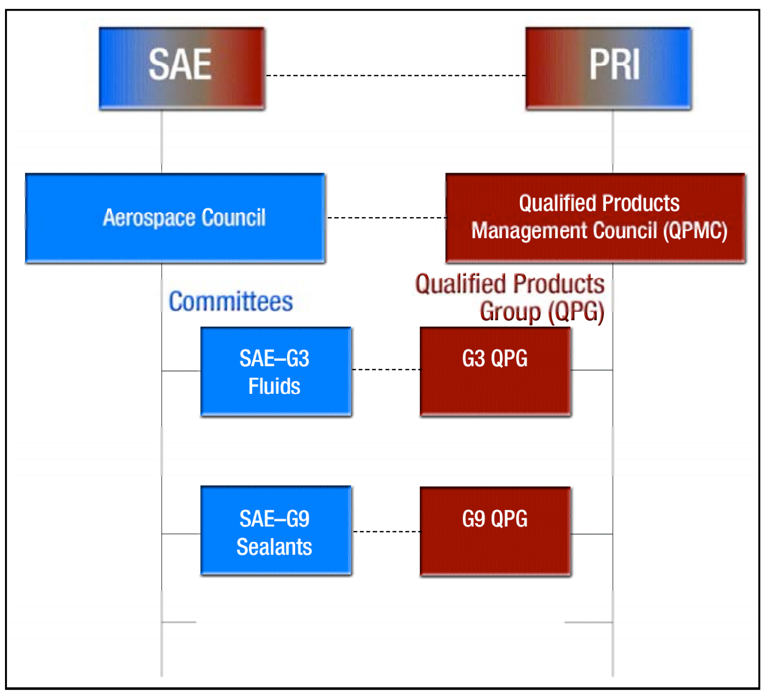
An industry/government/PRI team was formed to develop the organizational concept, policies, and procedures for an industry-managed and maintained QPL program. The organizational construct, depicted in Figure 1, had PRI authorizing and administering the broad qualification process, but not performing actual qualification testing. The team decided that a Qualified Products Management Council (QPMC) comprising industry and military volunteers would be formed under PRI to establish, manage, and control qualification processes and procedures and to adjudicate issues. Existing committees within standards development organizations would be used to

- determine which products required qualification,
- define the specific qualification testing requirements,
- integrate these into the NGSs,
- approve laboratories or facilities to conduct qualification testing,
- identify quality program requirements,
- establish recertification requirements, and
- form Qualified Product Groups (QPGs).

The QPGs would execute the technical decision process required to evaluate and qualify suppliers. Because decisions from QPGs would determine whether a candidate company has the manufacturing processes and controls to receive business, it was agreed that QPGs would consist of volunteer experts from industry and military users of the commodity; suppliers would not be allowed to participate on QPGs.

The team briefed the concept to the SAE Aerospace Council in the late 1990s; the council granted approval to use SAE standards to pilot the approach. After several successful pilot endeavors, the SAE Aerospace Council authorized widespread use of the PRI qualification approach for SAE standards. The program is now "up and running." To date, 25 industy-managed QPLs have been established.

FIGURE 1. O rganization of Industry/Gov e rnment/PRI Team.



The Qualification Process

Responsibilities for the qualification process are clearly divided between the technical committee that defines its specific QPL requirements and the associated QPG that executes the QPL. (Process details may be viewed at the PRI website: www.pri-network.org/PRI/IMprograms/QPL/.)

TECHNICAL COMMITTEE INITIATES QPL REQUIREMENT

The technical committee defines the consensus technical requirements for its standards. It's the committee's decision whether QPLs are appropriate for its product area. Will the QPL benefits justify the voluntary time commitments of the QPG chairperson and members? The QPMC has provided SDO guidelines for the technical committee's consideration in establishing a QPL.

If the technical committee decides that a QPL is warranted, it initiates the following actions:

- Defines the QPL requirements (for example, specific tests, "approved" testers, quality process documentation, recertification frequency, and level of retesting)
- Forms a QPG of "user" volunteers
- Revises the standard to incorporate the QPL requirements using the qualification statement template identifying PRI as the point of contact.

QPG IMPLEMENTS QPL PROCESS

The QPG evaluates the supplier's product against the QPL requirements stated in the technical committee's standard. The details of the process and procedures are available on the PRI website. The following is an overview of the process:

1. Supplier contacts PRI per the standard to request an application and associated information.
2. PRI provides the supplier with an application package delineating the required documentation (test report, quality process certification, etc.). In addition, the supplier is charged application and listing fees to cover PRI administrative costs.
3. Supplier arranges testing at an approved laboratory at the supplier's expense and provides the required application package documentation to PRI.
4. PRI reviews the application package for completeness and forwards it to the QPG members for disposition.
5. QPG schedules a meeting to review the supplier's application documentation. In general, the technical review should be a "go/no-go" decision (the product passed the test, the appropriate data were provided, etc.). If there appears to be a gray area, the QPG will request PRI to contact the supplier for additional confirming data. Regardless, all QPG qualification decisions must be unanimous and at least three QPG members must review and approve the listing. The QPG notifies PRI of its decision.
6. PRI notifies the supplier of the QPG decision. If approved, the supplier's product is listed on the QPL, which is immediately published on the PRI website.
7. PRI notifies the supplier when recertification is required per the standard. (The recertification process begins at step 2.)

QPG teleconference meetings have proven to be responsive and effective. In addition, the existing QPGs usually meet face to face either the day before or the day after their technical committee meetings.

It's Not a Free Lunch!

The benefits of a viable industry-managed QPL program are dependent on the contribution of all the participants:

- Suppliers are asked to pay for the testing of the product, required documentation, and PRI fees. These costs will be recaptured in the price charged for the product. Because the program will eliminate the redundant testing and qualification process of each customer, these costs may in fact be reduced.
- Users (industry/government) are asked to pay for the costs of providing technical experts as voluntary members of the QPGs and QPMC. These costs are offset by the reduction of each user's testing, qualification, and administrative costs associated with the procurement of products listed on the QPL.
- PRI is asked to pay for the costs associated with administering the program. These costs are recaptured in the fees charged to the suppliers.

There is an understandable reluctance of the technically cognizant industry or government engineer to accept the risk of losing unilateral control of their existing qualification process. However, this risk is similar to the risk we accept in using consensus NGSs. The risk can be mitigated in a similar strategy—active participation. In fact, active participation on the QPG virtually ensures a unilateral veto on QPLs, because all QPL listing decisions must be unanimous.

An Integrated Industrial Base "Win-Win"

The industry-managed QPL program has only scratched the surface of its potential benefits. This article is a standing invitation to all technical committees to consider the program's potential for their products. (The program is not limited to SAE technical committees.) The requirements are that committee members be willing to perform the QPG functions and that their employers be willing to leverage their existing NGS investments. This shared investment will reduce qualification infrastructure costs for the supplier, industry, and government.

Additional information is available at the PRI website (www.pri-network.org/PRI/IMprograms/QPL/) or by contacting the author (732-323-1979 or thomas.omara@navy.mil).

About the Author

Tom O'Mara heads the NAVAIR Systems Standardization Division. He has managed NAVAIR's Defense Standardization Program Preparing Activity function for the past 10 years. He currently chairs the industry-managed QPL program's Qualified Products Management Council.

Services "Feed" Logisticians' Need for Information

By Connie White

While fighting the global war on terrorism or even during times of relative "peace," today's armed forces consume materials and supplies at a voracious rate. Managing their needs creates an insatiable appetite for reliable, timely logistics information. That information comes from the Defense Logistics Information Service (DLIS), a Defense Logistics Agency (DLA) activity. DLIS manages logistics information for supply items used by the U.S. government, NATO, foreign governments, and private industry.

DLIS and the FCS

A fundamental piece of DLIS's logistical support is its administration of the Federal Catalog System (FCS), a single cataloging system with a uniform identification for all military supplies, providing economical, efficient, and effective supply management.

The FCS gathers, processes, and distributes logistics information for more than 6.2 million supply items, ranging from weapons systems to nuts and bolts used by the U.S. military and its allies. The FCS operates through the Federal Logistics Information System (FLIS), an automated data processing system that contains billions of characters of logistics data.

Another DLIS function is to serve as DoD's centralized cataloging activity responsible for gathering data, researching information, and preparing transactions for stock listing of new items of supply. DLIS also maintains national stock number (NSN) information. NSNs essentially serve as the DNA of the supply chain—the key to the information needed for acquisition, financial management, demilitarization, hazardous material handling, freight, packaging, and the prevention of pilferage. Many logistics systems rely on the data to make automated decisions about stockage and reordering.

History

The history of DLIS, formally known as the Defense Logistics Services Center, is closely connected to the FCS, which started in 1914 when the Navy first published a *Naval Depot Supply and Stock Catalog*. At the time, that catalog was the nearest thing to a uniform federal stock catalog. In 1929, it became the *Federal Standard Stock Catalog*.

During World War II, the enormous number of new items flooding the military supply systems often created duplication, lack of uniformity, and inefficiency, because each military service had their own means of parts identification. President Roosevelt recognized the costly duplication and the danger to both national security and the economy, so in 1945, he instructed the Bureau of the Budget to prepare and maintain a *U.S.*

Like the strands within DNA, the data elements represented by the numbers stored in FLIS unlock mysteries about supply items. Those data elements include the following mandatory information:

- Item name
- Federal Supply Class
- Manufacturer's part number
- Price
- Unit of issue
- Shelf-life code
- Precious metal information
- Automated data processing information.

Data elements can also include descriptive data such as the following:

- Dimensions
- Tolerances
- Material
- Finishes
- Material parts
- End item/used on applications.

Standard Commodity Catalog. Public Law 436, known as the Defense Cataloging and Standardization Act, was passed in 1952, further strengthening the FCS.

DoD decided to consolidate military cataloging components at DLIS in 1997. This milestone event in the DLIS evolution has made the organization an integral component of the logistics community.

The Navy and Marine Corps Cataloging Division

Known as DLIS-KB, the Navy and Marine Corps Cataloging Division, is the "home port" for the Naval Inventory Control Points (NAVICPs). It consists of three branches, two of which support NAVICPs: DLIS-KBA provides cataloging services for NAVICP Philadelphia, and DLIS-KBS provides those services for NAVICP Mechanicsburg. Both branches provide services for the Navy's management of supply items such as emergency NSN assignments, supply support request processing, maintenance actions for user information, classification and naming, characteristics and reference numbers, and cataloging collaboration requests.

DLIS produces the *Afloat Shopping Guide* (ASG) for a variety of Navy customers. The ASG is a tailored catalog of more than 28,000 commonly used shipboard items and more than 2,000 graphics. It is a valuable tool used to assist fleet personnel with identifying common shipboard or shore-based items in an easy-to-read format. The ASG uses cataloging information and describes the items for everyday use by sailors, storekeepers, shipbuilders, and maintenance personnel. In addition, it contains information on critical Navy programs such as Buy Our Spares Smart, Plastic Removal in the Marine Environment, Level 1 Fasteners, Navy Habitability Equipment Program, and Hazardous Material Control Office. Consisting of three volumes, the ASG is published annually and sent to more than 3,000 recipients. It is available in hard copy, on compact disc, and on the DLIS website.

Recently, DLIS worked with other DLA activities and the Navy in an effort to reduce supply costs as mandated by the Shipyard Transformation initiative. Catalogers analyzed supply records to identify existing items of supply that meet or exceed the requirements of locally purchased items. Following this, cataloging recommendations for commodities such as cutting blades, steam shop items, pipe hangers, insulation, and office supplies were forwarded to appropriate Navy offices to help the Navy identify ways to trim costs.

DLIS also executes the Navy's Defense Inactive Item Program focal point duties. The program identifies inactive items in the supply system for which there is a high probability that no future requirements will occur. Identified items are considered for elimination during each annual cycle.

DLIS Programs

The DoD Electronic Mall, known as "DoD EMALL," is a single entry point for buyers to find and acquire commercial off-the-shelf goods from suppliers and government sources. In February 2002, the Naval Supply Systems Command (Me-

The *Afloat Shopping Guide* is available to Navy customers by subscription. To subscribe, visit the DLIS website (www.dla.mil/dlis) and select the Cataloging link. Then click the Navy icon to go to the Navy Cataloging main page. There you will find a link that can be used to subscribe to the ASG. Questions about the content of the ASG can be directed to the program office at 269-961-4420 or (DSN) 661-4420. Distribution questions can be directed to the subscriptions office at 269-961-4459.

chanicsburg, PA) entered into a partnership with DLA to use DoD EMALL as the online hosting and ordering system to support Navy purchase card users. To date, the Navy Fleet and Industrial Supply Center contracting centers have added more than 300 commercial catalogs in support of historical purchase card buying patterns to meet the Navy's needs. Users can access DoD EMALL through One Touch Support using a single sign-on.

DoD EMALL provides a number of benefits for the customer. First, prices are reduced though negotiation with vendors for discounts that more closely match wholesale rather than retail. Second, it provides for competition on commercial items. Also, the customer can identify mandatory source items such as those that must be obtained from Javits-Wagner-O'Day suppliers. The customer also can see Material Safety Data Sheets for hazardous items (if included by the supplier). Finally, customers are provided the convenience of online ordering at their workplace, rather than the inconvenience of driving from store to store or calling several vendors.

Contact Center

As part of the DLA Virtual Contact Center, the Battle Creek Customer Contact Center operated by DLIS provides a unique partnership of government and private industry personnel dedicated to supporting the armed forces in war or peace. This partnership has led to the creation of a customer contact center, which operates 7 days a week, 24 hours a day. The center exceeds world-class standards for customer service. By calling one number (877-352-2255), customers can resolve questions and make contacts across all of DLA.

The benefits of the center have been demonstrated during the ongoing global war on terrorism. During activities in the mountains of Afghanistan, warfighter calls increased dramatically. In one instance, an Air Force C-5 aircraft was grounded in Spain due to a ruptured hydraulic line. In less than 4 hours, customer contact agents were able to resolve the issue so that the aircraft could continue its mission.

FED LOG

The FED LOG program provides user-friendly interfaces that enable the customer to quickly and easily retrieve information on more than 7.6 million NSNs and 13.7 million part numbers. Available on either compact disc or DVD, the product contains basic NSN information, characteristics data, and drawings. The basic information and characteristics data are updated monthly, while the drawings CD-ROM disc is updated quarterly. DLIS is proud to announce that FED LOG Version 5.85 is Navy Marine Corps Intranet certified and available. A demonstration of FED LOG can be found by visiting www.dla.mil/dlis and selecting Products. A link for an online sample of FED LOG is available on the DLIS Products page.

DLIS Virtual Representative

The DLIS Virtual Representative (vRep®) hosted on the DLIS website (www.dla.mil/dlis)—Phyllis—debuted on May 21, 2001. Ever since, customers have asked questions of Phyllis as though she were a human agent. Phyllis can answer common or most frequently asked questions identified from an analysis of past customer contact responses. Her unique capability helps customers navigate through layers of web pages to locate the information they need by simply responding to a question.

In addition, because the vRep has been linked to several DLIS databases, Phyllis can search the appropriate databases for responses to customer questions such as these: What is the CAGE code for General Motors? Who is CAGE Code 80063? What is FSC 5820? Phyllis can also suggest topics that educate the customer about what she knows concerning a given topic.

DLA Map Catalog

The DLA Map Catalog is an interactive catalog containing nearly 8,000 hydrographic charts used by the Navy and other mariners to navigate their way through seas across the world's oceans and waterways. The catalog features point-and-click technology that enables Navy quartermasters to plot a track and add charts that intersect their course to a shopping cart. The catalog then produces a MILSTRIP-compliant order that can be submitted via WEBREQ. In addition, instead of updating a chart catalog manually with weekly Notice to Mariners corrections, the DLA Map Catalog can be updated electronically by downloading new files from the DLIS website. At the DLIS home page, one can select Products, then Electronic Documents, then DLA Map Catalog. By using this automated catalog update procedure, the Navy avoids costs of approximately $1 million annually.

Conclusion

DLIS has a strong relationship with the Navy and continues to support all U.S. military services, government agencies, and the international community by providing logistics data in user-friendly products and services. DLIS's expertise in cataloging and information management makes it an important contributor to electronic commerce between the U.S. government and its many suppliers. For additional information about DLIS, visit www.dla.mil/dlis or call 877-352-2255. For more information about Navy cataloging services provided by DLIS, contact the author at constance.white@dla.mil or call 269-961-4194.

About the Author

Connie White is the chief of Navy Cataloging, Sea Side Branch, at DLIS. She has 20 years of experience in the cataloging field, working on weapons systems logistics, data systems development, and program management. Ms. White currently manages the cataloging workload for Naval Inventory Control Point Mechanicsburg.

Cost Avoidance Using Electronic Instead of Manual Updates

Manual:	26 hrs./yr. × 3,000 Navy users = 78,000 hrs.
Electronic:	4.3 hrs./yr. × 3,000 = 12,900 hrs.
Difference:	65,100 hrs.
Cost avoidance:	65,100 × 15.50 (E-6) = $1,009,050/yr.

Upcoming Events and Information

March 8-10, 2005, Chantilly, VA
Defense Standardization Conference

The Defense Standardization Program Office will be hosting its annual conference at the Westfields Marriott and Conference Center, Chantilly,VA. Panels will include the following:

- Services' and Agencies' Standardization Initiatives
- Standards Initiatives at Other Federal Agencies
- Non-Government Standards Initiatives
- Defense Standardization Program Automation
- Updates on Ongoing and Planned Changes to Defense Standardization Program Policies.

The next issue of the *DSP Journal* will contain an expanded list of agenda topics. Updates will be posted at dsp.dla.mil.

People in the Standardization Community

New DSPO Staff Member

Latasha Beckman joined the Defense Standardization Program Office as a general engineer. She earned a degree in industrial engineering in 2000 from the State University of New York at Buffalo School of Engineering and Applied Sciences and, in 2001, earned a master of science in industrial technology, with a concentration in manufacturing systems, from North Carolina A&T State University. She will assist with the development, issuance, and implementation of DoD-wide policies and procedures governing the Defense Standardization Program. Latasha comes to DSPO with a diverse background, including 3 years of experience with the U.S. Army Installation Management Agency (IMA) at Fort Eustis and Fort Monmouth as an industrial engineer. While with IMA, she worked in various capacities with the Directorate of Public Works, such as master planning, facilities operations, and business management, developing systems and processes to track contract performance and collecting and analyzing data for various initiatives.

Farewell

Charles Gallagher, director of the Supply Standards Division, General Services Administration (GSA), is retiring after a long tenure with GSA. Since 1997, he has been responsible for developing and promulgating government-wide federal standardization program policies and procedures and for preparing and maintaining the Federal Standardization Manual.

Welcomes

Kathleen Baden has been selected to succeed Charles Gallagher as the director of GSA's Supply Standards Division. Kathleen comes to the position with extensive experience in data analysis, market research, and planning and implementation of marketing strategies for GSA's Federal Supply Service. She also served as the GSA Departmental Standardization Office representative responsible for liaison between DoD and GSA on standardization issues. We welcome her into her new role and wish her the best.

Gerry Darsch, director of the Food area at Natick Soldier Center, has been appointed to serve as Standards Executive for the food area.

Jesse Kidd has assumed the standardization responsibilities at U.S. Army Corps of Engineers headquarters upon the retirement of Rick Dahnke.

DAU Courses—2005

Course	Number	Start Date	End Date	Location
PQM 103—Defense Specification Management	05-002	19 April 2005	29 April 2005	Fort Lee, VA
	05-701	10 May 2005	20 May 2005	Columbus, OH
	05-702	13 June 2005	23 June 2005	Philadelphia, PA
	05-003	12 July 2005	22 July 2005	Fort Lee, VA
	05-703	2 August 2005	12 August 2005	Columbus, OH
	05-704	22 August 2005	1 September 2005	Philadelphia, PA
PQM 104—Specification Selection and Application	05-001	15 March 2005	16 March 2005	Kettering, OH
PQM 202—Commercial and Nondevelopmental Item Acquisition for Technical Personnel	05-020	10 February 2005	11 February 2005	Huntsville, AL
	05-021	17 March 2005	18 March 2005	Kettering, OH
PQM 203—Commercial Item Descriptions for Engineering and Technical Personnel	05-001	9 February 2005	9 February 2005	Huntsville, AL
PQM 212—Market Research for Engineering and Technical Personnel	05-002	7 February 2005	8 February 2005	Huntsville, AL
	05-003	22 March 2005	23 March 2005	Fort Belvoir, VA
	05-702	5 April 2005	6 April 2005	Robins AFB, GA
	05-703	16 August 2005	17 August 2005	Linthicum, MD

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	Deadline for Articles
April–June 2005	Qualification & Conformity Assessment	November 15, 2004
July–September 2005	Air Force Standardization	February 15, 2005
October–December 2005	The Program Manager	May 15, 2005
January–March 2006	International Standardization	August 15, 2005

If you have ideas for articles or want more information, contact Tim Koczanski, Editor, *DSP Journal*, J-307, Defense Standardization Program Office, 8725 John J. Kingman Road, Stop 6233, Fort Belvoir, VA 22060-6221 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