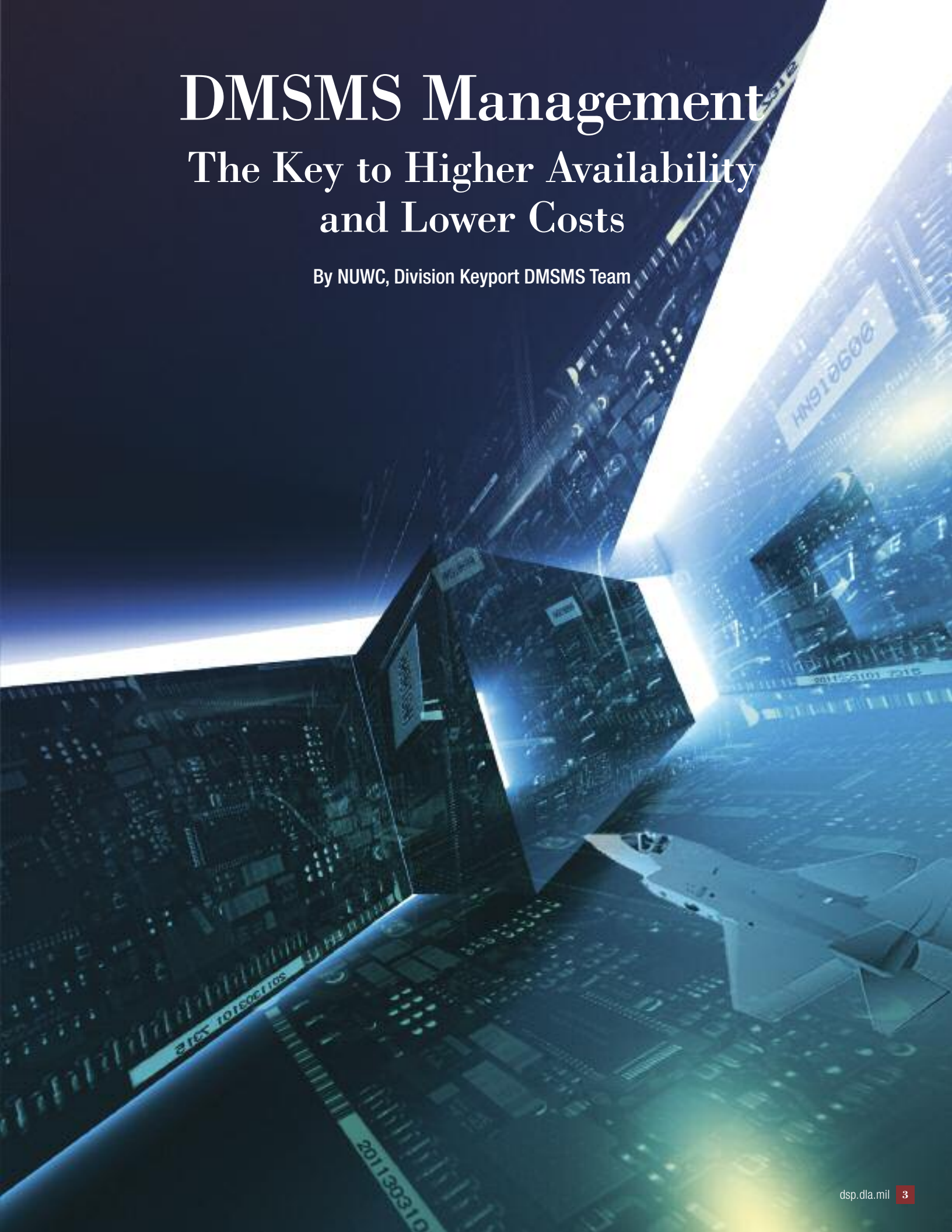
DMSMS Management

The Key to Higher Availability and Lower Costs

By NUWC, Division Keyport DMSMS Team



As defined in SD-22, *Diminishing Manufacturing Sources and Material Shortages: A Guidebook of Best Practices for Implementing a Robust DMSMS Management Program* (August 2012), Diminishing Manufacturing Sources and Material Shortages (DMSMS) is the loss, or impending loss, of manufacturers or suppliers of items, or raw materials, or software. DMSMS management is a multidisciplinary process to identify issues resulting from obsolescence, loss of manufacturing sources, or material shortages; to assess the potential for negative impacts to readiness; to analyze potential mitigation strategies; and then to implement the most cost-effective strategy.

DMSMS is a problem that has been confronting program managers, engineers, logisticians, and item managers, in both DoD and private industry, for many years. The problem has been accentuated by the move to more commercial off-the-shelf (COTS)–based architectures and the rapid evolution of technology. Almost anything—electronics, connectors, racks, motors, valves, software, adhesives, switches, circuit breakers, metal alloys, ceramic composites, and the list goes on—can become a DMSMS issue. With respect to material shortages, DMSMS can affect the manufacture of military systems and platforms such as submarines, ships, aircraft, and tanks.

DMSMS issues affect both acquisition and in-service platforms and can occur in all phases of the acquisition cycle, from design and development through post-production. DMSMS has the potential to severely impact production, system supportability, and life-cycle costs if not proactively managed. For example, since 2001, the *Virginia*-class submarine program has identified some 1,440 DMSMS issues.

Historically, the majority of DMSMS issues have been in the electronics area; however, DMSMS problems affect all weapon systems and material categories. One of the prime drivers of DMSMS issues is the commercial market's profit motive: when a part is no longer economical to produce, manufacturers will shut down product lines and move on to more profitable items. DoD procurement practices further compound the problem in the way they budget and fund the development, procurement, and sustainment of systems. Long durations between design and production, as well as the extended service life of 25 to 30 years, run counter to the now 4- to 7-year support cycle experienced with many commercial electronic systems.

In 1995, a Government Accountability Office audit[1] identified several DMSMS-related problems, including the following:

- DoD has not collected department-wide data on DMSMS situations and resolutions because the services do not have monitoring systems that provide quantitative information on the magnitude of the DMSMS problem.

- The responses by the services and the Defense Logistics Agency (DLA) to DMSMS situations have been primarily reactive.
- The Navy and the Army have begun developing predictive analysis systems, but they do not have service-wide approaches for all affected parts, and they have not evaluated the cost-effectiveness of DMSMS corrective actions.
- The services pay private contractors to conduct predictive analyses, which limits their use.
- DoD lacks DMSMS planning.

DMSMS Management at Keyport

In the mid-1980s, the Naval Sea Systems Command's (NAVSEA's) Naval Undersea Warfare Center (NUWC), Division Keyport (in Keyport, WA), established a team to manage obsolescence issues associated with submarine combat and sonar systems. However, it was not long before a diverse customer base was established and the team was addressing obsolescence issues for other submarine, surface, and aviation platforms such as the AV-8B Harrier and F/A-18 Hornet. To manage that amount of data effectively, Keyport developed a web-based tool called the Obsolescence Management Information System (OMIS™).

The *Virginia*-class submarine program selected Keyport to manage its obsolescence program. Keyport established a DMSMS management team (DMT) focused entirely on the *Virginia* class. The team comprised experts from depot engineering, with experience in supporting the repair of submarine systems, and experts from the in-service engineering agent, which provides integrated logistic support for submarines in the fleet.

The team identified the requirement to proactively monitor data associated with bills of material (BOMs) for circuit card assemblies, as well as the ability to cross-correlate data for items such as integrated circuits and COTS components that are used in multiple weapon systems. Efficiencies were obtained by monitoring each component once and correlating its obsolescence status with the different weapon systems.

In 2005, after independent validation by the Defense Microelectronics Activity, OMIS was endorsed by the Deputy Assistant Secretary of the Navy (Logistics) as a recognized system for managing DMSMS issues for the Navy. Currently, OMIS is a Navy-approved application providing DMSMS management support for NAVSEA, Naval Air Systems Command, and U.S. Marine Corps programs, as well as for private parties under a Center for Industrial/Technical Excellence Joint Partnership Agreement. The application has continually grown to meet the demand for managing obsolescence and now contains data for more than 50 systems DoD-wide.

Obsolescence Management for All Acquisition Phases

Establishment of a DMSMS management program early in the acquisition process provides invaluable cost-saving benefits over time by reducing or eliminating costly and unplanned technical refresh/redesign efforts. Keyport's obsolescence management approach includes a variety of DMSMS products and services critical to enhancing availability and maintainability to the warfighter (discussed later in this article).

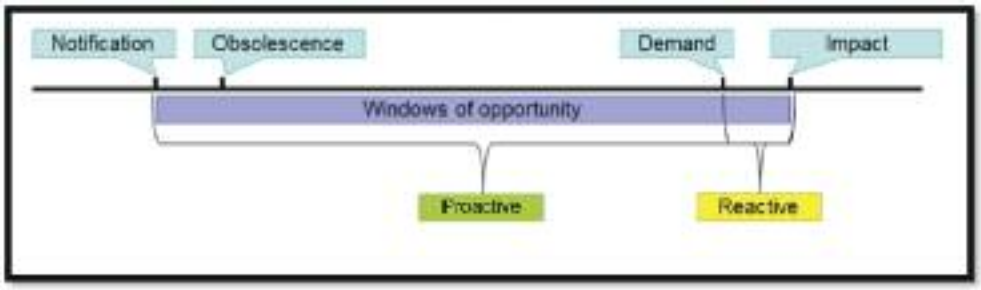
DMSMS management should span all acquisition phases. The various types of obsolescence management activities that occur in each phase are as follows:

- Materiel solution analysis/technology maturation and risk reduction
  - Develop DMSMS charters and DMSMS plans.
  - Develop systems obsolescence cost-over-time projections to minimize technical refresh/redesign costs.
  - Conduct initial technology review of prototype/engineering design model (EDM) systems BOMs.
- Engineering and manufacturing development
  - Establish DMTs.
  - Support DMSMS-related issues and meetings.
  - Conduct follow-on technology review of prototype/EDM system BOMs.
  - Perform technology trending and technology road mapping.
  - Work with program offices/prime contractors (integrators) to insert DMSMS requirements into all production and follow-on performance-based logistics contracts.
- Production and deployment
  - Facilitate DMTs.
  - Support DMSMS-related issues and meetings.
  - Research technical data to develop BOMs.
  - Load BOMs in OMIS and define system obsolescence.
  - Recommend solutions for obsolescence issues based on a best-value analysis.
  - Track obsolescence cases to completion.
- Operations and support
  - Proactively monitor electronic parts and COTS assemblies for obsolescence.
  - Issue periodic component/COTS obsolescence ALERT reports and supportability analysis reports.
  - Provide outyear budgetary estimates to mitigate obsolescence issues.
  - Update DMSMS charters and DMSMS plans.

Proactive versus Reactive Obsolescence Management

A proactive obsolescence management strategy ranges from actively monitoring the availability of critical system components to performing strategic technical refreshes that eliminate or minimize obsolescence. Performing proactive obsolescence management realizes high returns on investment due to early notification of discontinued system parts and components while identifying the most amount of potential solutions, creating a larger window of opportunity to evaluate logistics and engineering solutions that provide the greatest cost benefit to the system (Figure 1). In contrast, a reactive obsolescence management program deals with issues as they occur and incurs increased costs, because parts and components may no longer be available and could affect system operational availability. Because saving money and ensuring the sustainability of systems are important, Keyport utilizes a proactive obsolescence management strategy.

Figure 1. Windows of Opportunity for Proactive and Reactive Obsolescence Management



Data Used by OMIS

To get the most comprehensive and current parts status, OMIS is linked to data from various sources. The primary sources are the DLA EMALL, Naval Supply Systems Command (NAVSUP) weapon systems support (WSS) data, commercial logistics information services, and commercial part data information systems.

OMIS pulls the data from these sources and links it to the part data it stores. Another invaluable source of DMSMS data is Keyport's team of researchers, who reach out to manufacturers and suppliers of commercial items that are not listed or monitored in databases. The team periodically contacts these companies for the current life-cycle status of their products and then updates their status in OMIS. This process ensures complete coverage with no gaps in DMSMS management in order to have the most up-to-date and accurate information. The linking of DMSMS and logistics data enables the user to see not just the procurability of a part but also many factors related to its supportability. When looking for possible obsolescence issues, it is also necessary to look at the issue from a supply chain perspective. This is especially crucial when researching suitable substitutes following the identification of an obsolete part. The aggregation of data sources

linked to OMIS is used to view component availability, life-cycle projections, and risk assessments for system designs.

OMIS relates the hierarchically structured part data for a system with the information from the data sources to enable the user to visualize DMSMS issues and their impacts. In addition, OMIS allows Keyport's DMSMS experts to see how DMSMS issues affect all of the systems whose data are loaded into OMIS. This fact enables a level of collaboration on DMSMS issues that can save programs both time and money.

Keyport's DMTs use data from many other sources—such as the Government-Industry Data Exchange Program (GIDEP), configuration management systems, and FEDLOG—for additional information, including analysis of procurement history, part specifications, and where-used data. GIDEP is used to reduce or eliminate unnecessary resource expenditures by sharing parts information among government and industry participants. OMIS is a proven and accurate tool for program managers to proactively monitor and manage obsolescence and to make informed decisions.

Data Needed for Proactive DMSMS Management

Having sufficient data to complete an obsolescence analysis is the first step in enabling effective obsolescence mitigation and ensuring operational readiness and cost savings for the customer. Of course, all of the data must be verified to ensure that the most accurate and trusted data sources are used for decision making. Analyzing a BOM gives customers key pieces of information that will allow them to proactively manage obsolescence issues. The most crucial elements of the BOM are the manufacturer's name, part numbers, and nomenclature. With this information, the item's specification can be obtained and the production status can be determined. This emphasizes the need for programs to include BOM data as part of their deliverables. Part relationships are shown in OMIS and are used to determine the programmatic impact of the obsolete part. This allows DMSMS issues to be identified and remedied before they become severe enough to affect the warfighter or increase program costs.

DMSMS Management Teams

Because of the multiple disciplines needed to resolve DMSMS issues, Keyport is a strong advocate of DMTs. DMTs should be formed at program creation and continue to be active throughout the life of the program. A DMT's composition and engagement will vary depending on the scope and type of program. Examples of DMT participants are the program office representative, DMSMS service provider, prime integrator/contractor, NAVSUP WSS/DLA, and the responsible engineering activity. Keyport's DMSMS management personnel often participate as experts on DMTs. Members may be logisticians, supply specialists, engineers, program managers, and other key stakeholders. The appropriate participation and authority in the DMT are crucial to ensuring the timely com-

munication of issues to the correct stakeholders and allow for analysis of the various resolution options for the greatest return on investment.

Case Management/Resolution Options

When a DMSMS issue is identified, the DMT determines if the issue affects production or sustainment. OMIS provides a complete set of case management tools that link cases to the affected parts and allow joining of cases when collaboration is warranted. If there is an impact due to the DMSMS issue, a case is generated and assigned a tracking number. DMSMS case management is an approach to document, track, and resolve DMSMS issues throughout a system's acquisition and its life cycle. Often, several resolution options can be presented to the customer to best suit its program requirements. Table 1 summarizes the commonly used solution types.

Table 1. Summary of Commonly Used Solution Types

Solution	Definition
No solution required	A determination is made that the DMSMS issue will not impact the system because, for instance, sufficient stock is on hand to meet system needs.
Approved part	The obsolescence issue is resolved by the use of items already approved on the drawing and still in production.
Life-of-need buy	A sufficient quantity of the item is purchased to sustain the product until its next technology refresh or the discontinuance of the host assembly. Because this solution uses an approved item, no testing or drawing changes are required. The source of supply can be residual stock from the original manufacturer, shelf stock from distributers, sponsor-owned material, etc. Costs for packaging, storage, and transportation should be considered in the business case analysis for selecting solutions.
Extension of production or support	The supplier is incentivized to continue providing the obsolete items. This may involve long-term agreements to procure specific quantities of parts. One-time costs should be included in any cost and cost avoidance calculations.
Simple substitute	The item is replaced with an existing item that meets all requirements without modification to either the item or its next higher assembly (NHA) and requires only minimal qualification. Associated costs are largely administrative.
Complex substitute	A replacement item that has different specifications, but requires no modification of the source product or the NHA, is researched and validated.
Repair, refurbishment, or reclamation	The obsolescence issue is resolved by instituting a repair or refurbishment program for the existing item or assembly, whether a depot repair, a repair contract with the original manufacturer, or support from a third party.
Development of a new source	A replacement product is developed that meets the requirements of the original product without affecting the NHA. Nonrecurring engineering or other development-related activities will likely be required. The new product may be an emulation, a reverse-engineered product, or a product developed as a replacement using a different manufacturer but the original manufacturing designs and processes.
Redesign–NHA	The affected item's NHA must be modified. Only the NHA is affected, and the new design will not affect anything at a higher level in the system.
Redesign–complex/ system replacement	A major assembly redesign affects assemblies beyond the obsolete item's NHA and may require that higher-level assemblies, software, and interfaces be changed.

A business case analysis is used to choose the option that will provide the highest return on investment. That analysis may support a decision to do nothing to resolve the issue because of other factors, such as a planned technology refresh or sufficient supply of the affected system.

Two of the most commonly used solutions are simple substitutes and life-of-need buys:

- Simple substitutes are replacement parts with the same form, fit, and function as the original. Once the replacement part is authorized by the design agent, technical documentation can be updated before the initial part becomes obsolete or current inventories become depleted.
- Life-of-need buys are the purchase of a sufficient quantity of the part to sustain the equipment to its end-of-service date or until a planned technology refresh will replace the equipment.

Each of these solutions saves the program a costly and unnecessary redesign.

Measuring Success

Material availability and cost avoidance are two significant elements of a successful DMT. Proactive monitoring of parts for obsolescence issues within a weapon system or platform helps ensure the availability of the system for the warfighter as well as continued supportability for the future. The continued sustainment of a system and the assurance of adequate sparing are difficult to measure but are a vital result of effective DMSMS management.

The number and type of cases created, resolutions implemented, and the time to implementation are all key measures of a successful DMSMS program. They provide insight into the rate that DMSMS problems are being discovered and allow a program to staff and budget to meet the demand.

Cost avoidance is another key metric to measure the success of a robust DMSMS management program. Cost avoidance is based on a method defined in the SD-22 guidebook using established resolution types that are tied to standardized costs. The case management functions of OMIS enable the gathering of cost and cost avoidance data based on the standard DMSMS solutions. OMIS can easily generate reports that show a program's effectiveness.

Keyport's team has realized more than $225 million in cost avoidance for over 50 DoD customers over the past 18 months. The cost avoidance is attributable to the foresight and planning of a DMSMS team proactively managing DMSMS issues.

Summary

There are many compelling reasons to practice robust DMSMS management, including regulatory requirements, improved total life-cycle costs, and cost avoidance. A modest investment to implement processes and tools for proactive DMSMS management can lead to substantial benefits over the life of a system. The earlier in the acquisition process a DMSMS program is started, the more benefits can be realized. When DMSMS programs are initiated early in the acquisition process, designs can be modified to make DMSMS solutions easier to implement and have a significant impact on cost throughout a system's life. A program can maximize those benefits by establishing a DMT, utilizing DMSMS experts, and loading system data into a proactive DMSMS management system like OMIS. Proactive DMSMS management provides a more comprehensive and data-driven picture that allows for better planning to provide the most cost-effective solutions. It also enables program managers to leverage solutions for common obsolescence problems, leading to increased operational availability, reduced unplanned redesigns, reduced sustainment costs, and greater cost avoidance.

[1]Government Accountability Office, *Defense Inventory: Extent of Diminishing Manufacturing Sources Problems Still Unknown*, GAO/NSIAD-95-85, April 1995.

About the Author

NUWC, Division Keyport's Obsolescence Management Division comprises 80 government and contract personnel who provide DMSMS management support for approximately 50 programs. Keyport has been providing DMSMS support since the mid-1980s. In addition to DMSMS support, members of Keyport's DMSMS team are active participants in both the NAVSEA and DoD DMSMS working groups and have delivered numerous papers, presentations, and training sessions at the annual DMSMS conference.