DMSMS Management: After Years of Evolution, There's Still Room for Improvement

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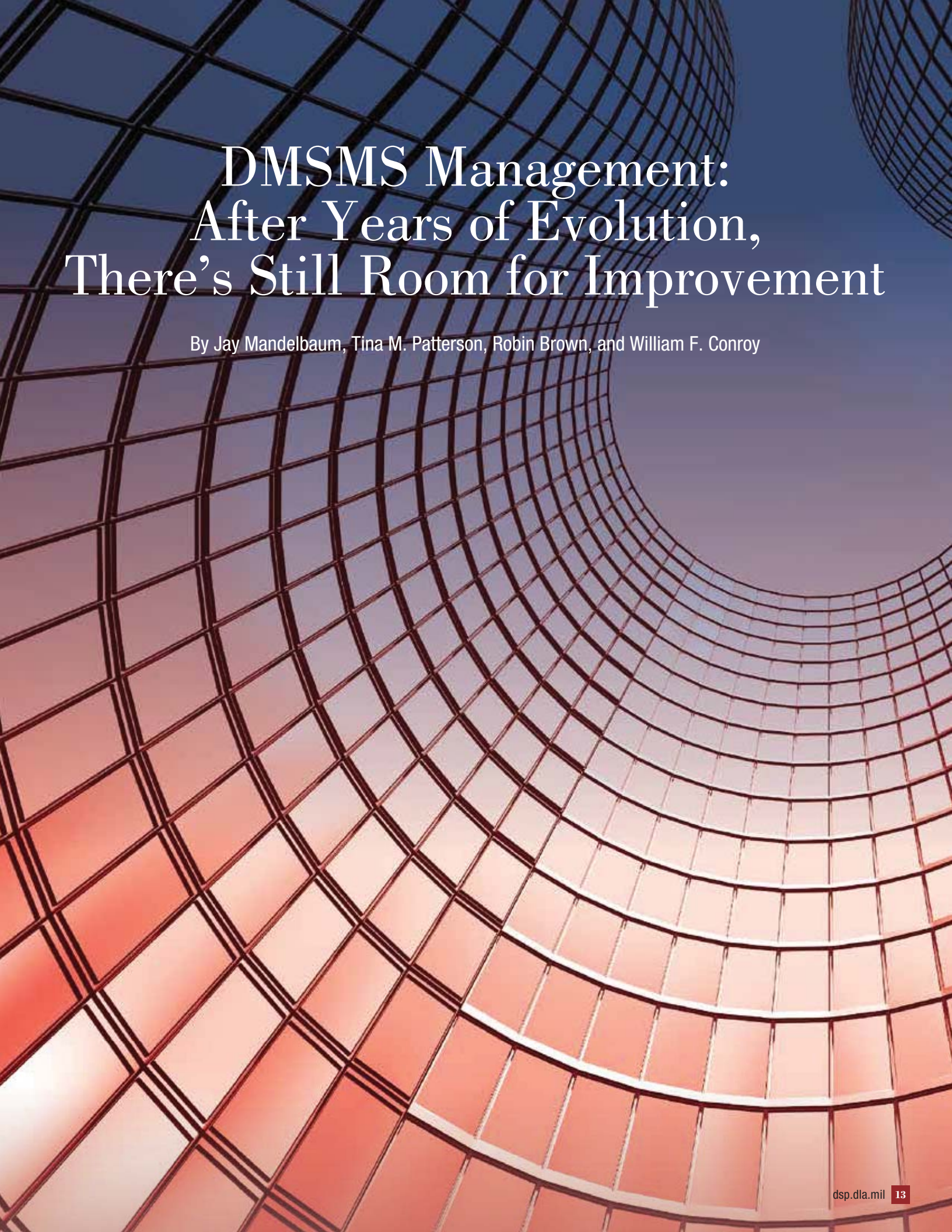

Which of the following two statements was made in the past 2 years, and which was articulated more than 25 years ago?

- A Department of Defense directive (DoDD) stated that "DoD Components shall assure that timely actions are initiated when a development program or an end item production or support capability is endangered by the lack, or impending lack, of manufacturing sources for items and material."
- A Deputy Assistant Secretary of Defense "expressed his concern over how Diminishing Manufacturing Sources and Material Shortages (DMSMS) were adversely affecting the readiness of weapon systems."

Actually, both quotes are more than 25 years old. The first is from 1976 and the second is from 1989. But both still apply today. Does this mean that DMSMS management practices have not changed for more than 40 years? No, it does not. This article provides a snapshot of what has changed.

Before discussing trends in DMSMS management, we must establish a common understanding of what it encompasses. Per DoD's DMSMS standardization document (SD) guidance, "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 on schedule and/or readiness; to analyze potential mitigation strategies; and then to implement the most cost-effective strategy" (SD-22).

DMSMS management should be carried out in a risk-based, proactive way. *Proactive* implies that efforts should be undertaken to identify issues as early as possible, thereby providing a longer window of opportunity to resolve them. This is important because the earlier an issue is identified, the greater the likelihood of a lower-cost resolution. *Risk-based* implies that monitoring activities to identify issues is not necessarily done everywhere. Monitoring should focus on the critical items most susceptible to obsolescence and that take more time to resolve.

There are multiple major contributing factors in the evolution of DMSMS management. The first two factors examined here primarily are related to the underlying forces driving the need for DMSMS management; the remaining factors mostly are associated with performing DMSMS management operations:

- Military acquisition and system sustainment
- DoD-level DMSMS policy and guidance
- Proactivity
- Items monitored

- Automation
- Centralization
- Research skills.

Changes to DMSMS Management Drivers

Two underlying trends in military acquisition and system sustainment had a significant impact on the extent to which DoD systems face DMSMS issues:

- *DoD's reduced ability to influence industry to resolve DMSMS issues.* The semiconductor industry is a good illustration of this constraint as electronics represent a substantial portion of difficult-to-resolve DMSMS issues. In 1960, DoD acquisitions accounted for roughly 50 percent of the global semiconductor market. Such a large share of market demand meant that DoD had considerable leverage to secure an industry response to obsolescence. By 1979, DoD's market share had declined to approximately 10 percent, and its influence on industry therefore decreased dramatically. Today, DoD accounts for only 1 percent of the market. This loss of influence is exacerbated by the low-volume quantities of many DoD procurements.
- *DoD's increasing emphasis on buying commercial components for military equipment to lower cost.* A 1986 Defense Science Board (DSB) summer study concluded that there already existed many examples of DoD systems using commercial products and that the time then was ideal for greater commercialization. That DSB study was not the first to reach this conclusion; many other studies dating back to 1972 support commercialization. There were also studies conducted after the 1986 DSB that reached the same conclusion, the most notable being the April 1994 President's Blue Ribbon Commission on Defense Management known as the Packard Commission. As a result, the Secretary of Defense established a policy in 1994 aimed at decreasing the reliance on military specifications and standards. From a DMSMS management perspective, the increased use of commercial products and processes in DoD systems has resulted in obsolescence posing a major problem because long life-cycle DoD systems include a great many short life-cycle commercial electronics.

DoD DMSMS policy and guidance are also important drivers of DMSMS management. The following is a condensed chronology of major DMSMS-related events.

DoDD 4005.16 was promulgated on DMSMS management in 1976. It is reasonable to assume that the timing was at least partially associated with DMSMS problems posed by electronics on military systems; at that time, the DoD share of the semiconductor market was only slightly greater than 10 percent. The directive assigned responsibility for DMSMS management policy and guidance to the then Assistant Secretary of Defense for Installations and Logistics. The directive was not explicit about proactivity. It emphasized resolving issues promptly, before impacts to readiness, and included approximately two pages of procedures.

The 1976 directive was revised in 1984. The responsibility for policy for DMSMS management was shifted to the Under Secretary of Defense for Research and Engineering. There also was a greater emphasis on proactivity—it included material about not designing with obsolete parts, it mentioned source availability research, and it emphasized data exchange along with the early issuance of discontinuation notices. The number of pages devoted to procedures expanded to nearly nine.

The 1984 directive was replaced in 1991 by a DoD instruction (DoDI) on acquisition procedures (DoDI 5000.1). However, that new 562-page acquisition instruction had minimal DMSMS management content. The standalone policy was eradicated ostensibly at a time of increasing DMSMS concern, as evidenced by the 1989 quotation at the beginning of this article. That quotation is from a report that developed an action plan for "both reactive and proactive steps to ameliorate the impact of DMSMS on DoD weapon systems." It should be noted that at the time of the 1989 report, the Under Secretary of Defense for Research and Engineering was no longer acting as the DoD DMSMS management focal point, as evidenced by the following statement by then Deputy Assistant Secretary of Defense for Logistics John Mittino: "I understand at your last symposium in Phoenix, Arizona, that there was a real concern about a lack of an Office of Assistant Secretary of Defense focal point for DMSMS. I want you to know that since that symposium I have volunteered to be that focal point."

All DMSMS management policy was not deleted with the cancellation of the 1984 directive. More than three pages of procedures have existed in a consolidated materiel management regulation since first published in 1993 (DoD 4140.1-R). Although the underlying documents have been renamed and updated along with some changes to the DMSMS management content, similar material remains in force today (DoD Manual 4140.01, Vol. 3). In January 2015, one sentence on DMSMS was added to the logistics enclosure of DoDI 5000.2 as a result of congressional language found in Section 803 of the Fiscal Year 2014 National Defense Authorization Act. The same sentence was revised in 2017 to change the emphasis of the 2015 insertion to reflect the relationship between the existence of DMSMS issues and the risk of encountering counterfeit parts. In addition, another reference to DMSMS and counterfeit was included in an enclosure on cybersecurity.

Supplemental guidance documents associated with various aspects of DMSMS management operations were published between 1999 and 2005. The first Defense Acquisition University continuous learning course on DMSMS management was released on May 10, 2005. The first of five DMSMS management standardization documents was issued in 2006. In 2017, the Life Cycle Sustainment Plan outline was modified to include a table on obsolescence management as one sustainment strategy consideration.

Trends in DMSMS Management

Proactive DMSMS management (identifying issues as early as possible) often leads to lower-cost resolutions. DMSMS management proactivity has increased with the coming of the information revolution to DoD. In the 1970s, DMSMS management primarily was reactive. When an item became obsolete, DMSMS management practitioners searched (often manually) through parts catalogs for alternatives. Although the idea of proactivity was implied, the word was not used within the 1984 directive. By the latter half of the 1980s, as evidenced by the aforementioned 1989 report, the need for proactive DMSMS management became part of the standard vocabulary of the DMSMS management community. It was enabled, to a significant degree, by automated tools and databases. Proactive behavior remains extremely important today; many (but not all) programs engage in robust, proactive DMSMS management practices.

The types of items being proactively monitored have also expanded over time, most extensively in the past decade. In the 1980s and 1990s, DMSMS management primarily focused on electronics; commercially available databases of electronic parts were an enabler in monitoring such items. This focus expanded in the mid-2000s to encompass commercial off-the-shelf (COTS) items and mechanical items, because the prevalence of COTS assemblies in DoD systems had been increasing and predominantly mechanical systems were experiencing increased obsolescence due to their long (and sometimes extended) service lives. Vendor surveys and internet research were the principal data sources for monitoring COTS and mechanical items. The 2015 version of the SD-22 also contains guidance on DMSMS management for materials and software. A few programs have initiated efforts in the software arena; proactive DMSMS management practices for raw materials are less mature.

Trends in automation have led to meaningful improvements in DMSMS management practices. Commercial electronics databases provide information about the status of parts (e.g., when they have been or are expected to be discontinued), and sources, specifications, and other details were added to this information in the early 1980s. Over time, these commercial databases have become more accurate: they include more parts and more information about those parts. In addition, the companies providing those databases have increased the DMSMS management services that they offer. These databases also were incorporated into larger DMSMS management information systems starting in the late 1980s, and these larger systems have themselves improved over time. For example, they have become more web based, their report generation capability has increased, they have incorporated data on non-electronic items as a result of vendor surveys, they have become more user friendly, and linkages have been established with logistics databases in order to estimate the date when an obsolete item will affect system availability.

The centralization of DMSMS management subject matter experts within large DMSMS management service providers has also changed the character of DMSMS management. With rising automation, program offices increasingly have turned to the large and ever more capable DMSMS management information systems or other centralized providers of DMSMS management services for subject matter expertise. In the 1970s and 1980s, individual program offices monitored their own items using their own staff subject matter experts. These experts were called upon to manually research resolutions once an item was no longer available—an entirely reactive approach. While a program office can still develop its own in-house expertise to perform DMSMS management functions by using the latest tools available, doing so is generally not a best practice. It will take time to train an in-house engineer on the tools and the intricacies of DMSMS management. People with great expertise, and many more years spent applying that expertise, can be easily sourced today from the organizations that provide the centralized DMSMS management information systems and/or centralized DMSMS management services.

Automation and centralization have yielded improved research capabilities to develop potential resolutions to DMSMS issues. Early DMSMS management practitioners in program offices and within the Defense Logistics Agency had substantial research skills. They were the first people called upon to verify whether an item could still be purchased and, if not, to suggest possible alternatives. Today, as a result of the expanded automated capabilities and experiences supporting multiple platforms, the subject matter experts using the DMSMS management information systems can quickly provide high-quality research results.

Summary

Since 2001, when the last DoD DMSMS management directive was canceled, the only official DoD DMSMS management *policy* has been a limited number of procedures included in material management/supply-chain issuances and one sentence in acquisition policy that appeared in 2015 and 2017.

Yet despite limited formal *policy*, there have been significant trends in DMSMS management capability over the years. To some degree, the capability has kept pace with the greater demands for robust, proactive DMSMS management resulting from the increased complexity of new weapon systems, the greater use of COTS assemblies, and the extension of the life cycle of older platforms.

DMSMS management *guidance* has similarly kept pace. The DMSMS community has demanded improved DoD guidance—and that demand has been met. The first SD-22 was published in 2006. The current SD-22, published in January 2016, was the fifth version issued in a 10-year span.

What's Next?

Even though there have been many advances, there always is room for further improvement. Additional benefits seem achievable because numerous interviews of DMSMS subject matter experts and DoD program management personnel revealed that a risk-based, proactive approach has not yet been adopted by all programs.

According to Eric Grothues, the DMSMS management lead for the Department of the Navy, "DMSMS has impacted virtually every weapons system throughout DoD. A DMSMS management policy requiring programs to develop and implement a process that is well grounded on proactive DMSMS management principles, tailored to mitigate the programs specific obsolescence risks, would provide program managers with the traction needed to get their weapons programs up to speed."

As more and more programs begin to pursue a risk-based, proactive approach to DMSMS management, there will be further cost reductions and fewer schedule slippages and readiness impacts due to DMSMS issues.

About the Authors

Jay Mandelbaum, while researching obsolescence policy, guidance, and training over the past 7 years, was instrumental in developing ways to use value engineering to resolve obsolescence issues.

Tina M. Patterson has been researching and developing obsolescence policy, guidance, and training over the past 7 years. Before that, she was involved in similar activities for systems engineering.

Robin Brown is the DMSMS lead. Before that, she was the Naval Air Systems Command (NAVAIR) DMSMS lead, provided support to all NAVAIR program offices, served as co-chair of the Department of the Navy DMSMS Working Group, and participated as a member of the DoD DMSMS Working Group for the past 15 years.

William F. Conroy III has been assigned to Defense Acquisition University as a professor of life-cycle logistics management and production, quality, and manufacturing since 2005.