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The Evolution of DMSMS Management in DOD – There's Still Room for Improvement

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I N S T I T U T E F O R D E F E N S E A N A L Y S E S

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Introduction

To set the stage for this article, we begin with a quiz. Which of the following two quotes was said in the last two years and which of the following was articulated more than 25 years ago?

- A Department of Defense Directive stated "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."

Trick answer—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 that mean 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 first must establish a common understanding of what it encompasses. Per the current Department of Defense (DOD) DMSMS standardization document (SD) guidance (the SD-22),[1] "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."

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 are not necessarily applied everywhere—focus should be put on critical items most susceptible to obsolescence and requiring more time to implement a resolution.

To convey the evolution of DMSMS management, this article briefly examines some of the major contributing factors. The first two factors are primarily related to the underlying forces driving the need for DMSMS management. The remaining factors are mostly associated with performing DMSMS management operations.

[1] Standardization Document (SD)-22, "Diminishing Manufacturing Sources and Material Shortages: A Guidebook of Best Practices for Implementing a Robust DMSMS Management Program," January 2015.

- 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 that 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 illustrates this point since electronics represent a substantial portion of difficult to resolve DMSMS issues. In 1960, DOD accounted for roughly 50 percent of the global semiconductor market.[2] Such a market share provided DOD with considerable leverage on industry to deal with obsolescence. By 1979, DOD's market share had declined to approximately 10 percent[3] and its influence on industry had decreased dramatically. Today, DOD only accounts for one percent of the market.[4] This loss of influence is further exacerbated by the fact that many of DOD procurements are low volume.
- *DOD's increasing emphasis on buying commercial components for military equipment to lower cost.* A 1986 Defense Science Board (DSB) summer study[5] concluded that there are already many examples of commercial products being used in DOD systems and that the timing for greater commercialization is ideal. This DSB study was not the first to draw this conclusion; there were many other studies dating back to 1972 that support commercialization, the most notable of which is The President's Blue Ribbon Commission on Defense Management also known as the Packard Commission.[6] A chain of events from these two efforts led to the Secretary of Defense establishing policy in 1994 to decrease reliance on military specifications and standards.[7] From a DMSMS perspective, increased use of commercial products and processes for DOD systems has implied that obsolescence will be a major problem because long life cycle DOD systems contain a great deal of short life cycle commercial electronics.

[2] David C. Mowery, "Innovation, market structure, and government policy in the American semiconductor electronics industry: A survey Mowery" Research Policy, Volume 12, Issue 4, August 1983, pages 183-197.
[3] Ibid.
[4] Paige Turner, "An Overview of the Semiconductor Industry," September 10, 2015, http://marketrealist.com/2015/09/overview-semiconductor-industry/
[5] Final Report of the Defense Science Board 1986 Summer Study on the Use of Commercial Components in Military Equipment, co-chaired by Dr. James R. Burnett and Dr. William J. Perry, January 1987.
[6] A Quest for Excellence, Final Report to the President by the President's Blue Ribbon Commission on Defense Management, June, 1986.
[7] Secretary of Defense Memorandum, subject: Specifications & Standards – A New Way of Doing Business, June 29, 1994, aka the Perry Memorandum.

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

- A DOD Directive on DMSMS was promulgated in 1976.[8,9] It is reasonable to assume that the timing was at least partially associated with DMSMS problems with electronics on military systems; at that point, the DOD share of the semiconductor market was only slightly greater than 10 percent. The Directive assigned responsibility for DMSMS 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.[10] Responsibility for policy for management of the DMSMS program 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 on acquisition procedures.[11] However, that new 562 page acquisition Instruction had minimal DMSMS content. This eradication of stand-alone policy occurred 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.[12]" It should be noted that at the time the 1989 report was published, the Under Secretary of Defense for Research and Engineering was no longer acting as the DOD DMSMS focal point as evidenced by the following statement by John Mittino, the Deputy Assistant Secretary of Defense for Logistics. "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.[13]"
- All DMSMS policy was not deleted with the cancellation of the 1984 Directive. More than three pages of procedures had existed in a consolidated materiel management regulation first published in 1993.[14] Although the underlying documents have been renamed and updated along with some

[8] DOD Directive 4005.16, Diminishing Manufacturing Sources and Material Shortages (DMSMS), December 3, 1976.
[9] This is the source of the first quotation at the beginning of the article.
[10] DOD Directive 4005.16, Diminishing Manufacturing Sources and Material Shortages Program, May 16, 1984.
[11] DODI 5000.2, Defense Acquisition Program Procedures, February 23, 1991.
[12] Deputy Assistant Secretary of Defense for Logistics, Report on Diminishing Manufacturing Sources and Material Shortages, Fiscal Year 1989.
[13] John A. Mittino, Deputy Assistant Secretary of Defense for Logistics, Keynote Address, Government/Industry Electronic Parts Nonavailability (DMSMS) Symposium, March 14, 1989, Williamsburg, Virginia.
[14] DOD 4140.1-R, DoD Materiel Management Regulation, Office of the Under Secretary of Defense for Acquisition and Technology. January 1993. That document consolidated material from multiple stand-alone directives and instructions that just been cancelled by DOD Directive 4140.1, Material Management Policy, 4 January 1993. While some of the DMSMS content of DOD 4140.1-R was new, a significant amount of its material was derived from the cancelled DOD Directive 4005.16 and from DOD Instruction 4115.40, Life-of-Type Buys of Secondary Items, December 19, 1983.

changes to the DMSMS content, similar material remains in force today.[15] In January 2015, one sentence on DMSMS was added to the logistics enclosure of DOD's defense acquisition system instruction[16] as a result of Congressional language found in Section 803 of the FY 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 DMSMS and counterfeit. In addition, another reference to DMSMS and counterfeit was included in an enclosure on cybersecurity.

- A number of 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 was released in May 10, 2005.[17] The first of five DMSMS standardization documents was issued in 2006.[18] In 2017, the Life Cycle Sustainment Plan outline was modified to include a table on obsolescence management in the as one sustainment strategy consideration.[19]

Trends in How DMSMS Management Operations Are Conducted

Proactive DMSMS management (identifying issues as early as possible) often leads to lower cost resolutions. DMSMS management proactivity has been increasing as the information revolution came to the DOD.

- In the 1970s, DMSMS management was primarily reactive. When an item became obsolete, DMSMS practitioners searched (often manually) parts catalogs for alternatives. Although the idea of proactivity was implied in the 1984 Directive, the word itself was not included.
- 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 community. It was enabled, to a significant degree, by automated tools and databases. Proactivity remains extremely important today; many (but not all) programs engage in robust, proactive DMSMS management practices.

The 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. This focus expanded in the mid-2000s to encompass commercial-off-the-shelf (COTS) items and mechanical systems because (1) the prevalence of COTS assemblies in DOD systems had been increasing and (2) mechanical systems were experiencing increased obsolescence due to their long (and sometimes extended) service life. Vendor surveys and internet research were the principal data sources. The 2015 version of the SD-22 also contains guidance on DMSMS management for materials and software. A few

[15] DOD Manual 4140.01, Volume 3, February 10, 2014, incorporating change 1 effective March 9, 2017, DoD Supply Chain materiel Management Procedures: Materiel Sourcing.
[16] DOD Instruction 5000.02, Operation of the Defense Acquisition System, January 7, 2015.
[17] CLL 201, DMSMS Fundamentals.
[18] SD-22, Diminishing Manufacturing Sources and Material Shortages (DMSMS) Guidebook, Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, November 1, 2006.
[19] Life Cycle Sustainment Plan Sample Outline, Version 2.0, January 19, 2017.

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 that provide information about the status of parts (e.g., have they been discontinued or when they are expected to be discontinued), sources, specifications, etc. appeared in the early 1980s. Over time, these commercial databases have become more accurate, they include more parts, and they provide more information about the parts. In addition, the companies providing those databases have increased the DMSMS management services that they offer.
- These databases have also been incorporated into larger DMSMS management information systems starting in the late 1980s, and, these larger systems have themselves improved over time. For instance, 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 with logistics databases have been established in order to estimate the date that an obsolete item will impact availability.

The centralization of DMSMS subject matter experts within large DMSMS service providers has also changed the character of DMSMS management.

- As automation increased, program offices have turned more and more to the large and increasingly 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 on-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 using the latest tools available, it 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 high levels of expertise, and with many more years of experience applying that expertise than an in-house engineer, can be easily secured today from the organizations providing 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.

- The early DMSMS practitioners in program offices and in the Defense Logistics Agency had substantial research skills. They were the first ones 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 multiple platform experience, the subject matter experts supporting the DMSMS management information systems have the capability to quickly provide high quality research results.

Summary

Since 2001, when the last DOD DMSMS Directive was cancelled, the only official DOD DMSMS *policy* has been some limited procedures included in material management/supply chain issuances and one sentence in acquisition policy that appeared in 2015 and 2017.

Despite this lack of progress in the policy arena, we have described significant trends in how DMSMS management capability has improved over time. 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, dated January 2015, is the fifth version to be issued in a 10-year time span.

What's Next?

Even though there have been many advances, there is always room for further improvement. We know this is true and that additional benefits could be achieved because not all programs have adopted a risk-based, proactive approach.

According to Eric Grothues, the DMSMS 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 then 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.

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Since 2001, when the last DOD DMSMS Directive was canceled, the only official DOD DMSMS policy has been some limited procedures included in material management/supply chain issuances and one sentence in acquisition policy that appeared in 2015. Despite this lack of progress in the policy arena, we have described significant trends in how DMSMS management capability has improved over time. 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, dated January 2015, is the fifth version to be issued in a 10-year time span.

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