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Parts and Material Lifecycle Management

DoDI 4245.15: Diminishing Manufacturing Sources and Material Shortages Management

DMSMS: Formal Recognition of Unparalleled Informal Collaborations

Be Strategic!—Leverage Technology Insertion and Refreshment to Mitigate and Fund Current and Future Resolution of DMSMS Issues

The 2021 SD-22: A New Perspective on Strategic DMSMS Management

Parts Management—An Up-Front Investment with Big Payoffs

Diminishing Manufacturing Sources and Material Shortages and Parts Management in the Adaptive Acquisition Framework

Contracting for Diminishing Manufacturing and Material Shortages and Parts Management

CLCL 014 Parts and Material Lifecycle Management Credential

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Director's Forum

Parts and Material Lifecycle Management

In this issue of the Defense Standardization Program Journal, we take a glance into the latest status of the Diminishing Manufacturing Sources and Material Shortages (DMSMS) and Parts Management programs. It is my pleasure to turn my column for this issue over to DSPO's very own Ms. Robin Brown, DMSMS and Parts Management Program Manager.

Michael A. Heaphy Jr.
Director
Defense Standardization Program Office

Greetings and Happy New Year!

2020 was a hard year for many reasons but, for DMSMS and Parts Management, 2020 was exceptional. The number and extent of our achievements is unbelievable! There is no way that anyone could have anticipated not only the tasks we completed but also the impact of these accomplishments on the warfighter. I am honored to be part of such a dedicated and talented team, for whom nothing is impossible.

First and foremost, the November 5, 2020 issuance of a DoD instruction (DoDI) on DMSMS management is monumental. Prior to this, DoD had been without a policy document focused on DMSMS management since 1976. During this near 50-year gap, while there were some bright spots, DMSMS management often suffered due to a lack of formal requirements. There was no direction to higher-level organizations to establish policy, offer guidance, or train. There was no enforceable consistency. That has all changed now! The DoDI requires the integration of DMSMS management during all aspects of a DoD system's lifecycle, from development to disposal. The instruction will enable greater collaboration, consistency, and institutionalization of the practice of proactive DMSMS management. As a result, the government will save money and readiness will increase.

Five years ago, when I became the DoD DMSMS Program Manager (PM), and three years later, when I became the PM for Parts Management, I inherited a list of gaps and a blueprint for strategic objectives aimed at closing those gaps. These strategic objectives continue to represent the drivers for the rigorous work of the now integrated DoD Parts and Material Management Working Group.

This edition of the *DSP Journal* specifically highlights some of that work:

- **Strategic DMSMS Management**. The updated SD-22 formally injects strategic concepts into the DMSMS management process. Adopting DMSMS-resilient designs that use parts early in their technological lifecycle, coupled with careful integration of DMSMS resolutions into technology refreshment and insertion efforts, reduces the negative effects of DMSMS on systems.
- **Parts Management Benefits.** Employing Parts Management best practices can positively impact weapon systems and maximize DMSMS resilience. Choosing optimum parts during design and employing Parts Management processes throughout a system's lifecycle can reduce costs and the number of obsolescence issues while increasing supportability, reliability, and mission readiness.
- **Tailoring for Acquisition Pathways**. Defense acquisition is no longer a monolithic process. Adaptive acquisition pathways match different circumstances, with the goal of cost-effectively giving the warfighter better solutions at an accelerated pace. Traditionally, DMSMS and Parts Management processes have been optimized for major capability acquisitions; however, these processes can be tailored for each acquisition pathway.
- **Contracting**. Last, but not least, is an article about contracting. DoD has many good ideas on how to improve DMSMS and Parts Management but relies on its industry partners for implementation. This article highlights the use of SD-26, "DMSMS Contract Language Guide," as a tool for effectively translating (DMSMS and eventually Parts Management) needs into contract requirements.

I encourage you to read these articles thoroughly!

Before signing off, I want to share two additional announcements about DMSMS and Parts Management that you can look forward to during the new year. First, we currently plan on holding a Parts and Materials Management Conference December 13-16, 2021 in Denver, Colorado. Please refer to www.PMMCmeeting.org for updates. Second, the Defense Acquisition University will be establishing a "Parts and Material Lifecycle Management" credential. The course material associated with this credential can boost skill levels quickly for new personnel as well as for those personnel whose job responsibilities continue to evolve.

My best wishes to you for a wonderful, inspirational, and productive 2021!

Robin Brown
Program Manager
Parts Management and DMSMS
Defense Standardization Program Office

DoDI 4245.15: Diminishing Manufacturing Sources and Material Shortages

Robin Brown
DMSMS Program Manager
Defense Standardization Program Office

The new Department of Defense (DoD) diminishing manufacturing sources and material shortages (DMSMS) management policy is now in effect! On November 5, 2020, the Honorable Ellen Lord signed DoD Instruction (DoDI) 4245.15, promulgating comprehensive DMSMS management regulations. Per the instruction, DoD policy is as follows:

- Establish and implement risk-based, proactive DMSMS management throughout the lifecycle of all DoD items.
- Evaluate all DoD system designs and redesigns for potential DMSMS issues that could arise during the lifecycle of DoD items.
- Implement resolutions, if necessary, to minimize or eliminate the risks and negative effects (e.g., cost, schedule delays, and readiness) of DMSMS issues throughout the lifecycle of DoD items.
- Implement improvements to DMSMS management processes throughout the lifecycle of all DoD items across the DoD enterprise.

KEY HIGHLIGHTS

- Designating the Assistant Secretary of Defense for Sustainment as the principal for DMSMS management in DoD
- Requiring the Defense Contract Management Agency to develop and implement a surveillance process to report the performance of contractors' DMSMS management activities and uncover risks to DoD customers as authorized by contract
- Directing component heads to establish DMSMS management metrics and internal reporting requirements to reduce costs and improve efficiency

- Mandating that program offices and other DMSMS-performing organizations develop and maintain a DMSMS management plan to document proactive, risk-based DMSMS management processes

View DoDI 4245.15: https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/424515p.PDF.

For more information to help you meet the requirements of this policy, please see below.

Related Standards and Guidebooks

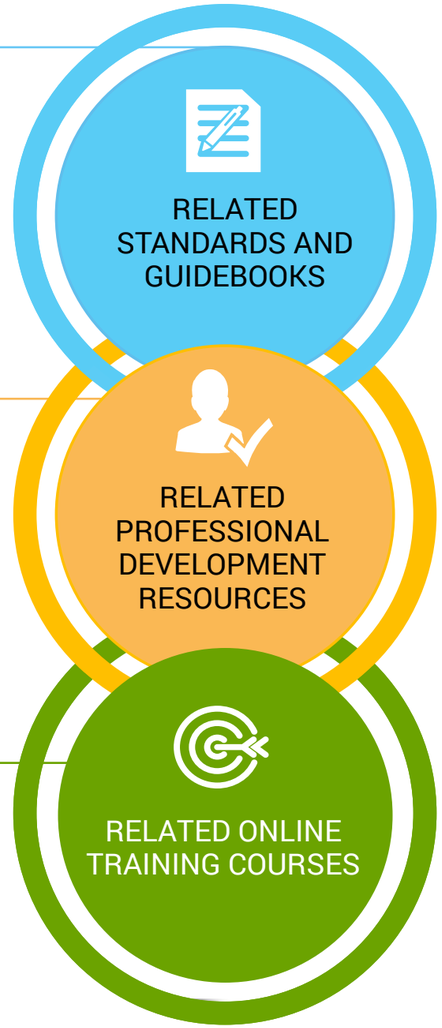
- SD-19, "Parts Management Guide"
- SD-22, "DMSMS: A Guidebook of Best Practices for Implementing a Robust DMSMS Management Program"
- SD-26, "DMSMS Contract Language Guidebook"
- MIL-STD-3018, "Parts Management"
- DoD DMSMS Management Plan Template
- IEC 62402, "Obsolescence Management"
- TECHAMERICA-STD-0016, "Standard for Preparing a DMSMS Management Plan"

Related Professional Development Resources

- DMSMS Knowledge Sharing Portal
- Parts Management Knowledge Sharing Portal
- DMSMS Contracting Job Support Tool
- DMSMS ACQuipedia article
- Parts Management ACQuipedia article
- Government-Industry Data Exchange Program ACQuipedia article

Related Online Training Courses

- LOG 0640 DMSMS: What The PM Needs To Do and Why
- LOG 0650 DMSMS Fundamentals
- LOG 0660 DMSMS Executive Overview
- LOG 0630 Introduction to Parts Management
- LOG 0670 DMSMS Basic Component Research



DMSMS: Formal Recognition of Unparalleled Informal Collaborations

Tami Lewiski, Digital Communications/UX Designer
Defense Acquisition University

It was 44 years in the making. That is, the recent signing by Under Secretary of Defense for Acquisition and Sustainment (USD[A&S]) Ms. Ellen Lord of the first issuance of a DoD DMSMS instruction (DoDI 4245.15) since 1976. It was also, according to Defense Acquisition University's (DAU's) Logistics Professor Bill Kobren, "A big deal."

For one reason, it's not often that practice precedes policy. It's usually the other way around. But in this particular case, the long-awaited instruction by USD(A&S) Ms. Lord's office effectively gave credence to decades of productive self-governance within the multi-functional discipline embodied by DoD's Diminishing Manufacturing Sources and Material Shortages (DMSMS) enterprise.

Because, rather than primarily stipulating new guidance to administer and follow, the instruction cites a plethora of existing products informally adhered to for years within the DMSMS community, among them, papers like Standardization Document 22 (SD-22) updated and observed by a wide consortium, both public and private.

As a result, the formal instruction recognizes an impressive internal structure carried out by the DoD DMSMS Working Group team members, so collaboratively, for so long. On its own impetus, the team continuously identifies and documents vital parts-acquisition, life-cycle product support and systems-engineering efforts, not the least of which is DMSMS training (cited eight times in Ms. Lord's decree), carefully curated to improve stewardship of U.S. taxpayer dollars and above all, readiness of its warfighters. This is exactly the kind of learning DAU offers, with exactly the type of teaming across armed services, private industry, and government agencies necessary to make it all happen.

"Led by Kevin Wedmark," says Kobren, "the DAU logistics team has collaboratively worked with the DSPO (which reports to the systems engineering office in the Office of the Secretary of Defense) and the DoD DMSMS/Parts Management Working Group for many years on a wide range of learning assets." Including two standardization courses managed by the Engineering & Technology community, DAU currently offers seven learning assets on these topics:

- LOG 0640 DMSMS: What The PM Needs To Do and Why
- LOG 0650 DMSMS Fundamentals
- LOG 0660 DMSMS Executive Overview
- LOG 0630 Introduction to Parts Management
- LOG 0670 DMSMS Basic Component Research
- CLE 064 Standardization in the Acquisition Life Cycle
- CLE 065 Standardization Documents.

Kobren, a prolific DAU blogger who spreads the word daily on just such shared-knowledge examples, took stock of the extensive portfolio of DAU's DMSMS assets. Along with his engineering and technology counterpart, Dave Pearson, the entire Logistics & Sustainment Center team coalesced various interactive tools, online training training modules, ACQuipedia articles, interdisciplinary processes, a wealth of guidebooks, and planned DAU Credentials, and posted them in various forums, including the three separate Communities of Practice (CoPs) devoted to DMSMS parts management and standardization:

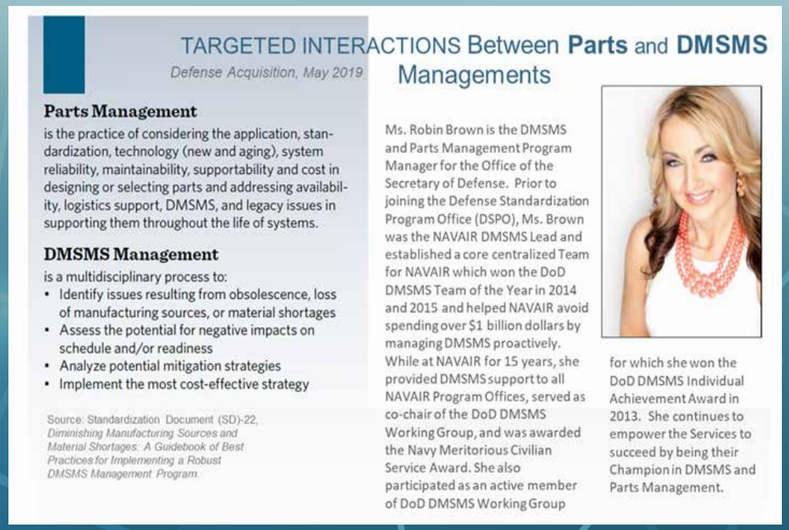
- DMSMS Knowledge Sharing Portal (DKSP) https://www.dau.edu/cop/dmsms/Pages/Default.aspx
- Parts Management Knowledge Sharing Portal (PMKSP) https://www.dau.edu/cop/pmksp/Pages/Default.aspx
- **Defense Standardization Knowledge Sharing Portal** https://www.dau.edu/cop/dsp/Pages/Default.aspx.

DAU faculty like Kobren also readily share their expertise at DoD conferences, symposiums, and workshops. Most such events are presently conducted virtually due to the pandemic but, in December 2019, when in-person gatherings were still being held, Kobren led a panel discussion at the annual DoD DMSMS and Defense Manufacturing Conference in Phoenix, Arizona. While there, he was awarded the 2019 DMSMS Champion for over 15 years of steadfast and unparalleled support to the DoD DMSMS and Parts Management Programs.

Robin Brown, who works for DSPO and serves as the DoD lead for DMSMS, wrote in her citation of Kobren's award, "His keen interest in fostering knowledge on the DMSMS and Parts Management Program goes far beyond the classroom."

The same could be said of Brown, who began her involvement in these areas while working for the Navy. She's come a long way since then, and some would say is perhaps the greatest cheerleader of all. When she's not organizing a symposium, leading a DoD working group, or advocating for new curriculum to help the cause, she's a strong explainer-in-chief when it comes to spreading DMSMS news. Among her bylines, in 2019 she co-authored an important piece for Defense Acquisition magazine.

Kobren accepting 2019 DMSMS Champion award.
Flanked by former DSPO Director Greg Saunders: DSPO DMSMS Lead Robin Brown.



TARGETED INTERACTIONS Between **Parts** and **DMSMS** Managements

Defense Acquisition, May 2019

Parts Management
is the practice of considering the application, standardization, technology (new and aging), system reliability, maintainability, supportability and cost in designing or selecting parts and addressing availability, logistics support, DMSMS, and legacy issues in supporting them throughout the life of systems.

DMSMS Management
is a multidisciplinary process to:
- Identify issues resulting from obsolescence, loss of manufacturing sources, or material shortages
- Assess the potential for negative impacts on schedule and/or readiness
- Analyze potential mitigation strategies
- Implement the most cost-effective strategy

Source: Standardization Document (SD)-22, *Diminishing Manufacturing Sources and Material Shortages: A Guidebook of Best Practices for Implementing a Robust DMSMS Management Program*

Ms. Robin Brown is the DMSMS and Parts Management Program Manager for the Office of the Secretary of Defense. Prior to joining the Defense Standardization Program Office (DSPO), Ms. Brown was the NAVAIR DMSMS Lead and established a core centralized Team for NAVAIR which won the DoD DMSMS Team of the Year in 2014 and 2015 and helped NAVAIR avoid spending over $1 billion dollars by managing DMSMS proactively. While at NAVAIR for 15 years, she provided DMSMS support to all NAVAIR Program Offices, served as co-chair of the DoD DMSMS Working Group, and was awarded the Navy Meritorious Civilian Service Award. She also participated as an active member of DoD DMSMS Working Group for which she won the DoD DMSMS Individual Achievement Award in 2013. She continues to empower the Services to succeed by being their Champion in DMSMS and Parts Management.

No surprise, then, Brown's immediate comment regarding the November 5 instruction update by Ms. Lord, "I am ecstatic that the management policy is now in effect!" Because, Brown goes on to acknowledge, of its larger impact in "promulgating comprehensive DMSMS management regulations."

Along with Greg Saunders, until recently the DSPO Director and Brown's superior, and Alex Melnikow (hence retired) who preceded in her position, those doing heavy lifting in the many collaborative disciplines that make up the broad category of defense standardization (DMSMS and Parts Management) are numerous. The primary DAU participants include the following:

Standards & Standardization
- Dave Pearson (LOG)
- Jim Weitzner (E&T)
- Mike Flynn (E&T)
- Jim Colson (LOG)

DMSMS & Parts Management
- Bill Kobren (LOG)
- Kevin Wedmark (LOG)
- Doug Killey (LOG, prior to 2019 retirement)
- Jim Davis (LOG)
- Bill Conroy (LOG).

Of course, in the end, nothing gets people's attention like hard facts and high numbers, especially astounding dollar impacts should known policies, procedures, and best-practices not be followed.

"On average, approximately 7% of obsolescence issues involve some form of redesign. These potentialities vary in cost from $725,000 if only the component requires redesign, to $1.2 million if the next higher assembly requires redesign, to $11.4 million if the system/subsystem requires redesign," according to Brown. "Detecting issues early is what proactive DMSMS management is all about."

Take, for instance, Brown goes on to say, "At Keyport Naval Base in Washington State, with some 3,500 FY20 cases involving about 60 DoD program offices, the average resolution cost

was $125,864.10." Importantly, she explains, "This average resolution cost is far less than a redesign. In total, Keyport reported that $130 million in costs were avoided by being proactive."

Dollars aside, everyone involved with DMSMS agrees, it's the warfighter who benefits by their collective contributions, properly carried out.

"The longstanding, multi-business unit, multidisciplinary, multi-learning asset effort has proven an enduring win-win-win-win-win," as Kobren puts it. "DAU wins because the quality of our learning assets on a range of key topics are enhanced. Our faculty win because our collective knowledge base grows as we collaborate on learning asset-development projects. The DSPO wins because it can better reach—and support—the workforce. The defense acquisition workforce and acquisition program office win because the breadth and depth of available professional development resources is enhanced. And, ultimately, the warfighter wins because proactive DMSMS and Parts Management are such an integral aspect of obsolescence mitigation, supply chain risk management, and weapon system availability."

In the true spirit of their close collaborations over the years, Kobren, along with Brown and others, just wrapped up a community Town Hall (hosted by George Mason University, December 2, 2020) devoted to the subject of Ms. Lord's recent instruction. The popular event, attended by around 475 DMSMS devotees, public and private, shared success stories and challenges ahead. Nearly everyone seemed to concur that the new DMSMS formalizations will go a long way toward preserving the safety of America and bringing down costs in the process.

As Brown put it during the forum, "It's pay now or pay more later." No one wants the repercussions nor onerous weight of the latter occurring under their watch. Taking the opportunity to weigh in more seriously on the event's central instigation, Ms. Lord's signature instruction, Brown expounded, "It gives clear direction and requires that DoD component heads establish, develop, and implement integrated risk-based, proactive policy, procedures, regulations, guidance, and training across the services. There has not been a clear requirement for DMSMS management for many decades. This [now] should enable collaboration at a level we have not yet experienced in all organizations that have military equipment. Last, but not least, we should be saving the government money and increasing readiness."

Indeed. If you missed this informative virtual discussion, you can request a copy of the presentation by contacting Brown directly at Robin Brown.

If you would like more information on DAU's DMSMS learning assets and community at-large engagements, be sure to visit the primary CoP on the subject, the DMSMS Knowledge Sharing Portal. There you'll find links to every paper, policy ,and learning product cited in this story, along with key contacts that include David Greinke, senior consultant at LMI and a major contributor to DAU's CoPs on these subjects, and Kevin Wedmark.

"The longstanding, multi-business unit, multidisciplinary, multi-learning asset effort has proven an enduring win-win-win-win-win," as Kobren puts it.

Be Strategic!—Leverage Technology Insertion and Refreshment to Mitigate and Fund Current and Future Resolution of DMSMS Issues

Dr. Jay Mandelbaum and Ms. Christina Patterson, IDA

SD-22, "Diminishing Manufacturing Sources and Material Shortages (DMSMS): A Guidebook of Best Practices for Implementing a Robust DMSMS Management Program," offers guidance for evaluating resolutions for DMSMS issues and how to program and budget for those resolutions. This programming and budgeting guidance concentrates on the funding required for standalone DMSMS resolutions. Oftentimes, however, other planned system modifications[1] (e.g., technology insertion and technology refreshment) to improve performance, reliability, maintainability, and supportability can resolve DMSMS issues. This article highlights how a program office should use the updated SD-22[2] to augment its proactive DMSMS management strategically by leveraging technology insertion and refreshment to mitigate and fund the resolution of DMSMS issues. Being strategic not only reduces cost and other ill effects of DMSMS issues, it can also result in fewer and more easily resolvable issues in the future.

TACTICAL APPROACH TO DMSMS RESOLUTIONS AND THEIR COSTS

DMSMS issues are inevitable. DoD program offices, particularly those responsible for long-lived systems, face DMSMS issues that require resolutions to avoid or mitigate negative effects on cost, schedule, and readiness throughout the life of their systems. No system is immune; DMSMS issues can surface during any phase of a system's lifecycle.

Proactive DMSMS management assists program offices in extending the window of opportunity for addressing and managing DMSMS issues; however, a strategic approach that explicitly leverages other program office efforts to change the system design can further aid in resolving obsolescence.

When a program office discovers[3] a DMSMS issue, it needs to evaluate and implement a DMSMS resolution before that issue negatively

1 For this article, a modification project represents any project that changes the design configuration of the item.

2 The 2021 reissuance of SD-22 introduces additional strategic operational processes for program offices to apply to their execution of the five DMSMS management steps—prepare, identify, assess, analyze, and implement.

3 Discovery occurs when an item is unavailable for purchase, a discontinuation notice or equivalent has been issued, or the item's manufacturer plans the release of a discontinuation notice.

affects the system. In such instances, the primary driver for resolutions is not improved capability or reliability but the continued production or operation of the system. SD-22 defines nine resolution types (*see Table 1*), spanning logistics and engineering categories, for a program office to consider and employ.

DMSMS resolutions require technical approval and funding for their implementation. The responsible engineering authority for a system recommends the best resolution to pursue while the program office calculates and obtains the amount and type of funding (i.e., appropriation) required to implement the resolution. The required amount of funding depends on the item of focus, the resolution type, and the relevant cost factors.

Non-recurring engineering (NRE) costs represent critical considerations for a program office's DMSMS resolution cost calculations. The NRE consideration encapsulates the one-time costs associated with designing and developing a new item or a modification of an item to mitigate the DMSMS issue. All DMSMS resolution types require some level of testing; therefore, program offices must incorporate testing costs (e.g., the cost of the tests themselves, revision to test procedures, and repair and maintenance of test equipment) into cost calculations for their DMSMS resolutions. Other considerations for cost calculations include purchasing the required engineering, design, and technical data; revising engineering and logistic data to support the resolution; procuring the item and spares; and developing and maintaining training for the new item.

When calculating DMSMS resolution funding needs, program offices should program and budget for resolutions for all known and anticipated DMSMS issues. Actual cost data for resolutions are preferred to support programming and budgeting requests but different approaches can assist a program office in calculating DMSMS resolution funding needs. For example, *Table 1* reflects an SD-22 table with the average cost of each of the nine resolution types. In the absence of specific cost

Table 1. Average Cost (FY21 Dollars) Associated with Implementing Each DMSMS Resolution Type[4]

Resolution option	Average
Approved item	$1,165
Life of need buy	$5,928
Simple substitute	$14,247
Complex substitute	$28,779
Extension of production or support	$28,850
Repair, refurbishment, or reclamation	$73,637
Development of a new item or source	$742,333
Redesign–next higher assembly	$1,237,793
Redesign–complex/system replacement	$11,652,368

[4] Table 1 contains average cost numbers for each of the resolution types in SD-22.

data for a resolution, a program office can use SD-22's average resolution cost factors to estimate DMSMS resolution costs. If a program office has resolved DMSMS issues previously, the office can use that data to improve the estimates for the DMSMS resolution funding it needs for the programming and budgeting period.

STRATEGIC ENHANCEMENTS FROM LEVERAGING TECHNOLOGY REFRESHMENT AND INSERTION PLANS

The approach for calculating DMSMS resolutions and their associated costs described in the previous section, while important, will not capture all a program office's efforts associated with the resolution of its DMSMS issues. Certain DMSMS resolutions are less obvious because not all these issues are addressed purely through efforts to avoid or mitigate DMSMS.

The resolution of a DMSMS issue results from program offices responding to changing operational requirements that require different or improved system capability. A resolution to a DMSMS issue could occur through another program effort to improve the reliability and maintainability of the system. Program offices may resolve DMSMS issues in conjunction with broader technology insertion or refreshment efforts (e.g., capability enhancement, planned maintenance, sustaining support, life extension, and preplanned product improvements) to address varying purposes.

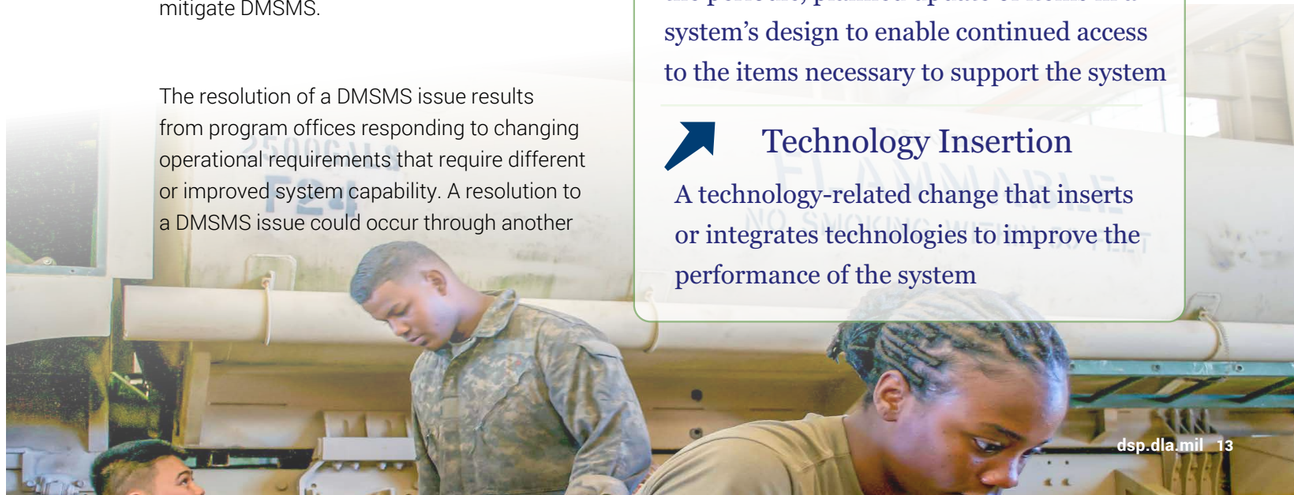
The integration of DMSMS resolutions and mitigation activities with these efforts has often been ad hoc; however, ad hoc processes are almost always suboptimal, missing opportunities to lower costs. Chances to reduce the number and severity of future DMSMS issues are lost. A more strategic approach to resolve DMSMS issues through

Technology Refreshment

A technology-related change as part of the periodic, planned update of items in a system's design to enable continued access to the items necessary to support the system

Technology Insertion

A technology-related change that inserts or integrates technologies to improve the performance of the system



planned technology insertion and refreshment is needed.

Efficiencies can emerge if the resolution of a DMSMS issue is integrated purposely with a larger project modifying the system's design. Deliberately incorporating the resolution of known and anticipated DMSMS issues into such projects can prove convenient and less costly by combining work efforts on the same subsystem. The primary purpose of such projects is capability and performance improvements or enhancements to reliability or maintainability, not ensuring the continued production or operation of the system. Integration with these projects can resolve DMSMS issues at a lower cost than efforts pursued in isolation or a non-systematic way.

Given that DMSMS issues are inevitable, the only way to prevent them is to develop a plan for replacing obsolete and soon-to-be obsolete items before they negatively affect the system. Applying a strategic approach to DMSMS management better prepares a program office to address DMSMS resolutions optimally through integration with planned system modifications.

Technology management represents one strategic avenue for making this integration a reality. Effective technology management, which relies on a strategic understanding of the market, results in technology roadmaps, informing acquisition and lifecycle sustainment strategies on ways to resolve and minimize the cost of known and anticipated obsolescence issues. By resolving DMSMS issues intentionally at the same time as the integration of new technologies in a system design through technology refreshment and insertion, program offices ensure the continued sustainability of the system while fielding a system with greater reliability, lower sustainment costs, and increased performance.

Program offices can use market research on technology advancements and trends to 1) improve the selection of technologies and items for incorporation into a system's design and 2) optimize when to pursue a modification or series of modifications during a system's lifecycle. Technology roadmaps represent one way for a program office to organize its knowledge and visualize technology trends in the near-, mid-, and far-terms to aid decisions about when to integrate new technologies into the system's design. Using this information, a program office can plan for technology insertion to improve system performance or technology refreshment to address items known and forecasted to become obsolete (based on their underlying technology) before they negatively affect the program office's cost, schedule, or performance objectives for its system.

Technology Roadmap

Documentation of the trends of a technology associated with items on a system of interest to manage technology-related change, ensuring continued support of the system or improving the performance of the system

DMSMS management should have a symbiotic relationship with technology roadmapping and planned technology insertion and refreshment efforts. By following technology trends, DMSMS management practitioners gain an improved understanding of when an item will likely reach its end of life (EOL). Improved EOL forecasts increase the time a program office has to calculate the best resolution for a DMSMS issue, enabling availability of the greatest number of lower-cost resolution options from which to choose. Understanding technology EOLs and any program office plans to update the item with that technology prior to that date can alleviate the need for a DMSMS resolution in the first place. Such instances occur when enough stock of the DMSMS item exists to satisfy demand through when that item will be designed out of the system. Technology roadmapping and planning for technology insertions and refreshments can also benefit from DMSMS management outputs. Knowledge of DMSMS issues and when they are anticipated to influence the system should inform the timing and scope of a program office's technology insertion and refreshment projects.

Program offices can further apply strategic practices when planning for a technology-related change of a system's design. Any change to a system's design offers the opportunity to improve DMSMS resilience. DMSMS resilience results when

- designs minimize the incorporation of items with known or forecasted obsolescence based on an improved understanding of the estimated EOLs and
- design principles readily enable the replacement of items without significant redesign efforts (e.g., modular open systems architectures).

Reviewing the design changes associated with technology insertion and refreshment and eliminating, when possible, items with known or forecasted DMSMS issues reduces the number of future DMSMS issues and makes it easier to resolve those that surface.

IMPROVED TRANSPARENCY, COMMUNICATION, AND RELATIONSHIPS ARE KEY

To realize the efficiencies in the previous section, DMSMS management practitioners must be involved in any program office's technology roadmapping and technology insertion and refreshment planning for changes to the system's design. Likewise, the system's known and anticipated DMSMS issues should inform the program office's technology roadmapping and technology insertion and refreshment plans.

The existence of multiple stakeholder communities with different sets of roles and responsibilities can prevent a program office

from capitalizing on these opportunities for efficiencies. The DMSMS management community does not control technology roadmapping and technology insertion and refreshment planning processes. Other acquisition and sustainment stakeholders are responsible for those processes. Further complicating matters, these different stakeholder communities are not always aware of the others' efforts and communication may be limited or nonexistent.

A lack of transparency and poor communication can result in situations where known and anticipated obsolescence facing the system and technology roadmapping and plans for technology insertion and refreshment are not widely known across the program office. Without knowledge of planned technology insertions or refreshments, DMSMS management practitioners cannot recommend when best to integrate DMSMS resolutions into projects. Furthermore, DMSMS management practitioners might pursue a more costly standalone DMSMS resolution even though the resolution of the DMSMS issue could be addressed as part of a larger effort or might not be necessary (e.g., if the item will be designed out of the system before the DMSMS issue affects cost, schedule, or performance). Similarly, planners responsible for technology insertion and refreshment projects may postpone a project, necessitating a standalone project to resolve DMSMS issues that will affect the system if not addressed prior to the new timeline for the modification project. Therefore, lack of transparency and poor communication exacerbate the likelihood of missing opportunities for efficiencies and DMSMS resolutions at lower cost.

Program offices should foster transparency and insist on communication and relationship building between stakeholders for DMSMS management, technology roadmapping, and planning for technology insertions and refreshments. In the absence of direction and encouragement from program office leadership, these stakeholders should find and reach out for communication among these communities. Such relationships will improve the transparency of program office plans for modifications to the system design and the existence of known and anticipated obsolescence risk associated with those designs. This transparency will enable the DMSMS management community to recommend when best to resolve DMSMS issues as part of the program office's modification efforts for the system. Other acquisition and sustainment communities will learn the benefits of DMSMS management community inputs and ensure their integration with modification plans. The program office benefits overall from resolving DMSMS issues at lower cost, better understanding the total cost of DMSMS resolutions, and avoiding negative effects on cost, schedule, and performance.

The 2021 SD-22: A New Perspective on Strategic DMSMS Management

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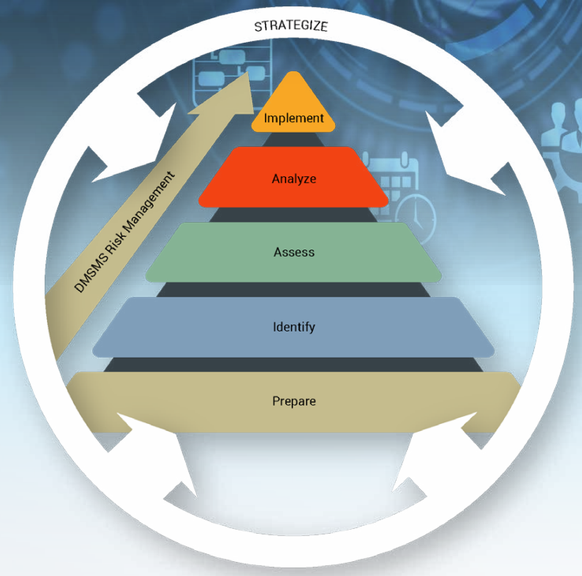

While a long list of changes could be generated, this note focuses on the major differences between the 2016 and the 2021 SD-22s. The organizational construct for presenting these differences is the Diminishing Manufacturing Sources and Material Shortages (DMSMS) management process which is, in effect, the SD-22 table of contents. The conceptual figure now includes "Strategize." This addition corresponds to several strategic operational processes that are now woven throughout the DMSMS management steps.

- **Front Matter**: The new SD-22 describes recently approved, DMSMS management-centric Department of Defense (DoD) Instruction (DoDI) 4245.15. With respect to the new acquisition pathways, a theoretical approach for conducting effective DMSMS management is presented. It appears that many of the DMSMS practices associated with major capability acquisition are not easily adapted to the new pathways designed to rapidly field capability; however, the strategic DMSMS concepts of technology roadmapping, refreshment, and insertion will have a major contribution in these pathways.
- **Prepare Step:** The new SD-22 contains a revised description of the DMSMS management plan (DMP) to detail how to meet the DoDI requirement for a DMP. Processes for establishing supporting contracts, evaluating program effectiveness, and advocating for DMSMS resilient designs are described, highlighting the strategic aspects of the latter

two processes. A new appendix on programming and budgeting for DMSMS management operations emphasizes the importance of a standalone program and budget line item for this function. A record keeping and metrics appendix includes a data dictionary and examples of beneficial uses of the data for improving efficiency, programming and budgeting, and calculating returns on investment.

- **Identify Step**: New strategic processes for assessing preliminary designs and forecasting technology obsolescence to identify potential future DMSMS issues were developed for the new SD-22. An appendix on building or acquiring bills of material and the associated intellectual property considerations is included.
- **Assess Step**: The elements of the assessment process were reorganized to make them more intuitive. There is a new appendix which provides detailed guidance on conducting DMSMS health assessments.
- **Analyze Step**: DMSMS resolution cost factors were inflated to fiscal year 2021 dollars.
- **Implement Step**: Material on how to estimate costs for DMSMS resolutions has been updated in the new SD-22. A new appendix on programming and budgeting for resolutions includes material on the use of working capital funds to resolve DMSMS issues. It also points out the importance of a separate budget line item for this function. The importance of integrating DMSMS resolution funding with technology refreshment and technology insertion is a major focus.

Parts Management—An Up-Front Investment with Big Payoffs

If you were told that you could improve weapon systems' reliability and sustainability, and reduce costs, parts proliferation, and system downtime while saving millions of dollars over the lifecycle of the program, why wouldn't you? Implementing parts management processes during the design of a system and throughout the system's lifecycle can lead to improvements in all these factors as well as many other benefits—if parts management processes are properly implemented.

WHAT IS PARTS MANAGEMENT?

Parts management, as part of the engineering process, is the practice of considering the application, standardization, technology (new and aging), system reliability, maintainability, supportability, performance, and cost in selecting parts and addressing availability, logistics support, diminishing manufacturing sources and material shortages (DMSMS), and legacy issues that will enhance supporting parts throughout the life of the systems.

In short, parts management processes determine the optimum parts for an end item while considering all the factors that may affect program outcomes.

Selecting the right parts is fundamental to achieving many engineering and manufacturing objectives, and it influences cost, schedule, and performance. Parts are the basic units from which systems are created. Because the reliability, maintainability, and supportability of the end item are dependent on the parts that comprise it, effective parts management is an important contributor to the long-term success of any program. Finally, parts management processes improve operational readiness and reduce lifecycle costs by promoting the use of common, widely available, reliable parts.

PARTS MANAGEMENT POLICY AND GUIDANCE

Throughout the Department of Defense (DoD), awareness regarding the value and benefits of parts management is not as strong as it could be, and only a few organizations make parts management a mandatory requirement for system acquisition contracts.

Parts management is often seen as a cost driver and schedule inhibitor and can be a low priority due to a near-term focus on program schedule and cost. This can create a reluctance to expend time and resources to ensure that selected parts will be available and effective once the system is deployed.

However, DoD policy is clear that parts management should be employed as part of engineering and standardization processes.

DoD Instruction (DoDI) 5000.88, "Engineering of Defense Systems," states: "The PM [program manager] will ensure that a parts management process is used for the selection of parts during design to consider the life cycle application stresses, standardization, technology (e.g., new and ageing), reliability, maintainability, supportability, life cycle cost, and diminishing manufacturing sources and material shortages. As applicable, parts management requirements should be specified in the RFP's [request for proposal's] statement of work for the TMRR [technology maturation and risk reduction], EMD [engineering and manufacturing development], and production acquisition phases."[1]

What is a Part?

It is important to understand what part types are being addressed by the parts management program. "Part" could denote different hardware levels, depending on how the term is used. In the context of a parts management program, these part types are one or more joined pieces not normally subject to disassembly without destruction or impairment of their intended design use.

Examples of these part types include microcircuits, connectors, resistors, capacitors, fasteners, bearings, valves, screws, and rivets.

Additionally, DoD Manual (DoDM) 4120.24, "Defense Standardization Program Procedures," addresses parts management as a mandatory standardization consideration. "Program offices should ensure that a parts management process is used to reduce the proliferation of parts and associated documentation and promote the use of parts with acceptable performance, quality, and reliability, as specified in Military Standard (MIL-STD)-3018. Total ownership cost analysis must also be applied in the selection of parts for the program."[2]

Parts management experts should collaborate closely with systems engineers in the early design phase of acquisition to influence the parts selection process and steer designers away from bad or problematic parts. Not considering parts management in the design phase can lead to problems later in the life of a system, such as part obsolescence, poor part quality, and supplier and parts shortages, and can lead to increased maintenance costs and reduced operational availability, negatively affecting long-term overall system readiness.

So, what are some of the benefits of parts management? There are many benefits that can come from implementing an effective parts management program and selecting the optimum parts during design and redesign.

REDUCED COSTS AND THE PROLIFERATION OF PARTS

Parts management helps save design and lifecycle costs of equipment by promoting the application of commonly used or preferred parts. Standardization of parts, replacing numerous similar parts with one common part, results in larger part-type buys because the common parts can be used in multiple applications. Identifying the right parts during design is much more cost effective than correcting bad decisions after designs are already set.

Using a parts management process for selecting parts in engineering and design will help avoid duplication of work between designers, engineers, and support personnel. Larger part-type buys enable both the contractor and the customer to benefit from economies of scale and reduce the contractor's cost of maintaining technical data and storing, tracking, and distributing multiple parts.

Virginia-Class Submarine Program

An example of the impact of parts management on cost and proliferation of parts can be seen in the Virginia-class submarine program. Prior submarine-class design and construction suffered from parts proliferation. The Trident class required 28,000 procured parts, the Los Angeles class had 29,000 procured parts, and the Seawolf class required 45,000 procured parts.[3]

During the design of the Virginia-class submarine, the program office collected lessons learned from previous submarine programs and invested in a parts management program. These efforts reduced the number of parts in the initial issue of drawings to 17,963, a 60 percent reduction from the Seawolf class. Over the life of the Virginia-class program, the $27 million investment in parts management and standardization was projected to lead to $789 million in cost avoidance.[4]

1 DoDI 5000.88, "Engineering of Defense Systems," November 18, 2020, Section 3, paragraph 6.f.

2 DoDM 4120.24, "Defense Standardization Program Procedures," September 24, 2014, Enclosure 4, paragraph 2.c.

3 Defense Standardization Program Case Study, "The Virginia Class Submarine Program," p. 2.

4 See Note 3, p. 6 (2007 dollars not adjusted for inflation).

ENHANCED READINESS AND INTEROPERABILITY

When items or systems share common components, repair time is shorter because parts are more likely to be on hand or readily available from manufacturers, and technicians spend less time solving individual problems. In addition, using common components simplifies logistics support and enhances substitutability because fewer parts are stocked, translating to savings in procuring, testing, warehousing, and transporting parts.

REDUCED ACQUISITION LEAD TIME

Using preferred parts reduces the time between the purchase request and the receipt of the part. When preferred parts or parts active in the supply system are used, the government and industry avoid the expenses and delays of designing, developing, testing, and qualifying parts and the issues of acquiring a new item with no known supplier base.

INCREASED SUPPORTABILITY AND SAFETY

Preferred parts reduce risk and improve the chances that equipment will perform reliably. Preferred parts have a history of proven reliability, withstanding rigorous testing, and performing at stated levels. Their use decreases the number of part failures, reducing the number of maintenance actions and potentially precluding failures that could cause mission failure or loss of life.

ENHANCED RELIABILITY AND MAINTAINABILITY

A thorough parts management plan ensures that parts meet contractual requirements and applicable standards, resulting in enhanced reliability, availability, and maintainability of the system. Common components and preferred parts also reduce maintenance problems caused by procurement delays.

REDUCED LOGISTICS FOOTPRINT

Reducing the number of new or nonstandard parts can reduce follow-on logistics support by reducing the number of new part numbers and associated changes to information systems, support documentation, special tools or support equipment, and physical storage space. Standard and common parts also increase the potential for part substitution, reduce obsolescence, and decrease changes to bill of material.

DOD AND NASA SPACE AND MISSILE SYSTEMS

An example of how an effective parts management program positively influences supportability, reliability, maintainability, and safety of a system can be found in a 2011 Government Accountability Office (GAO) study of 21 DoD and National Aeronautics and Space Administration (NASA) programs.[5] Parts quality has incredibly high stakes for DoD and NASA space and missile systems, where even small issues can lead to catastrophic failures. Not only are the projects undertaken highly complex, facing extreme environments, they usually cannot be repaired or paused once deployed.[6]

The GAO identified some of the causes of parts quality problems:

- **Poor workmanship**
- **Undocumented and untested manufacturing processes**
- **Poor control of those processes and materials and failure to prevent contamination**
- **Poor part design**
- **Design complexity**
- **Inattention to manufacturing risks**
- **Ineffective supplier management.**

The GAO found parts quality and reliability problems that contributed to significant cost overruns, schedule delays, and reduced system reliability and availability. It also found that these issues had more significant cost and schedule consequences when discovered late in the development cycle. For example, one problem resulted in about $250 million in unplanned costs and a 2-year launch delay. While we do not have the details of parts management procedures that DoD and NASA contractors used in these specific cases, employing effective parts management processes could have reduced these quality problems.

PARTS MANAGEMENT IMPLEMENTATION

Parts management is the responsibility of both the government and the contractor, with the contractor developing and implementing a parts management plan and the government program office implementing parts management requirements. An effective parts management team (with both government and industry representatives) integrates system design and parts management personnel who jointly participate in selecting parts. An effective parts management program improves a company's design and manufacturing processes so introducing new parts and inserting technology become a systematic process.

A parts management plan is an essential element of a parts management program. Parts management plans come in all sizes, titles, and content, but the most important aspect of the parts management plan should be tailored to meet the unique needs and characteristics of the program it supports. Therefore, any parts management plans need to be comprehensive yet flexible. When the acquisition program office creates an RFP, it can include the requirement for contractors to respond with a parts management plan through the statement of work to explain how they intend to apply the principles of parts management. The elements of a parts management plan should address the following:

- Part selection baseline
- Part selection and authorization
- DMSMS and obsolescence management
- Parts list or bill of materials (BOM)
- Subcontractor management
- Part and supplier quality
- Part-level documentation procedures
- Substitute and alternate part procedures
- Customer-contractor teaming
- Counterfeit parts
- Lead-free electronic parts and other environmental concerns
- Additional elements as required by the statement of work.

[5] GAO, *Space and Missile Defense Acquisitions: Periodic Assessment Needed to Correct Parts Quality Problems in Major Programs,* GAO-11-404, June 2011.

[6] See Note 5, p. 6.

More details about parts management and parts management plans can be found in Standardization Document 19 (SD-19), "Parts Management Guidebook," and MIL-STD-3018, "Parts Management." The guidance in these documents, when used together, will help employ successful parts management plans and procedures.

CONCLUSION

If parts management sounds like an important engineering design consideration, well—it is—especially in today's acquisition environment characterized by rapidly changing designs and technologies and by increased risk to DoD weapon systems and equipment due to issues with parts that affect reliability, standardization, supportability, and affordability. Effective parts management, employed early in system design, can offer significant benefits throughout the lifecycle of the system. The benefits of parts management are apparent and well worth the investment early in the system design process because it is a case of paying now or paying more later.

Author Bios

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Additional Information on Parts Management

LOG 0630 Introduction to Parts Management

MIL-STD 3018, "Parts Management"

SD-19, "Parts Management Guide"

SD-22, "DMSMS Guidebook"

SD-26, "DMSMS Contract Language Guidebook"

DoDI 5000.88, "Engineering of Defense Systems"

DoDI 4120.24, "Defense Standardization Program (DSP)"

Diminishing Manufacturing Sources and Material Shortages and Parts Management in the Adaptive Acquisition Framework

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BACKGROUND

In December 2019, the Office of the Under Secretary of Defense for Acquisition and Sustainment promulgated Department of Defense Instruction (DoDI) 5000.8, "Operation of the Middle Tier of Acquisition (MTA)." DoDI 5000.8 adds several new lanes to the previous two in DoDI 5000.2, "Operation of the Defense Acquisition System" which provided the Major Capability Acquisition and Defense Business Systems pathways (see *Figure 1*).

As shown in *Figure 1*, DoDI 5000.8 adds the Urgent Capability Acquisition, Software Acquisition,

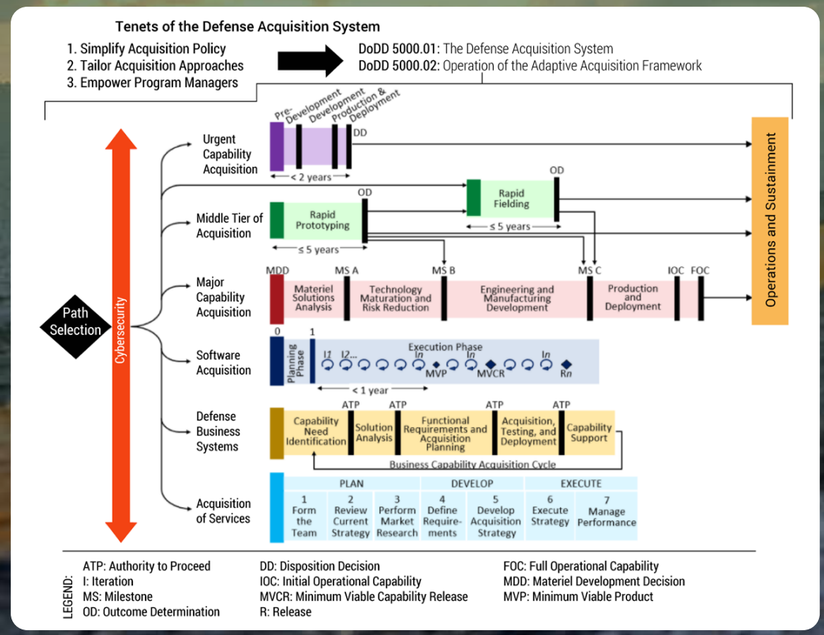

***Figure 1*. The Adaptive Acquisition Framework**

and Acquisition of Services pathways. These new pathways provide the defense components more flexibility and focus on the specific type of capability introduced. While all the pathways are important, this article focuses on the Urgent Capability Acquisition and Middle Tier Acquisition pathways. Currently, the Army Futures Command is engaged in prototype weapon systems development in these lanes.

The Urgent Capability Acquisition pathway is highly compressed and must be completed from predevelopment to delivery in less than two years. This leaves very little time to develop a prototype and makes it unlikely that any strategic diminishing manufacturing sources and material shortages (DMSMS) or Parts Management methods, techniques, and tools may be introduced to influence the system design. This doesn't mean we can't try! Later in this article, we examine a few ways to introduce both strategic obsolescence and smart Parts Management into the Urgent Capability Acquisition pathway. For now, we focus on the MTA lane and see what might be done here.

It's important to remember that the MTA pathway is intended to fill a gap in the Defense Acquisition System for those capabilities that have a level of maturity to allow them to be rapidly prototyped within an acquisition program or fielded, within 5 years of the MTA program start. The MTA pathway can accelerate capability maturation before transitioning to another acquisition pathway (e.g., Major Capabilities Acquisition) or may be used to minimally develop a capability before rapidly fielding. MTA offers two paths to develop new capabilities:

- **Rapid Protoyping:** The rapid prototyping path provides for the use of innovative technologies to rapidly develop fieldable prototypes to demonstrate new capabilities and meet emerging military needs. The objective of an acquisition program under this path will be to field a prototype that meets defined requirements for demonstration in an operational environment and produces a residual operational capability within 5 years of the MTA program start date.
- **Rapid Fielding:** The rapid fielding path provides for the use of proven technologies to field production quantities of new or upgraded systems with minimal development required. The objective of an acquisition program under this path will be to begin production within 6 months and complete fielding within 5 years of the MTA program start date.

MTA AND DMSMS MANAGEMENT

Let's look at some of the impacts imposed by these new acquisition pathways on DMSMS and Parts Management. MTA presents unique challenges to strategic DMSMS management due to the short timeframes (less than 5 years) involved in these projects. Unlike DoDI 5000.2, "Operation of the Defense Acquisition System," DoDI 5000.8 does not include a requirement for DMSMS. Moreover, DoDI 5000.8 streamlines the acquisition process by removing almost all program documentation requirements. This is where the DANGER sign should be placed! There are no logistics documentation requirements under Rapid Prototyping (see description) and the only requirement for logistics in the Rapid Fielding path is for a tailored Life Cycle Support Plan (LCSP). This lack of formal program development, which is in large part accomplished by developing the key program documentation artifacts like the Acquisition Strategy (AS), System Engineering Plan (SEP), and LCSP, is one challenge.

The other challenge more specific to DMSMS management is: How do we insert strategic DMSMS requirements into a Rapid Prototype effort? Most MTA Rapid Prototypes are developed based on Urgent Operational Needs (UONs) under the direction of the Acquisition Executive. There is no "prime contractor" or an acquisition contract to insert DMSMS requirements. Many of these prototypes are designed and built under DoD Ordnance Technology Consortium (DOTC) contracts, which fall under Other Transaction Authority (OTA), to a single developer without competition. *Figure 2* is a diagram of some possible strategic DMSMS techniques that can be used in these rapid development pathways.

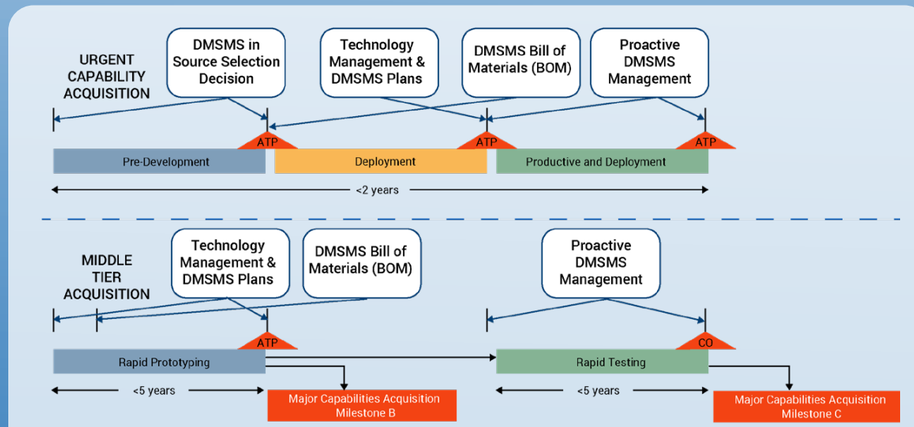

Figure 2. Strategic Obsolescence in the Urgent Capability Acquisition and MTA Pathways

Given these challenges, what can DMSMS managers do to ensure strategic obsolescence requirements are included in MTA projects? The following are several key practices that can be used to "inject" specific DMSMS requirements into UON and MTA prototype system design and development in order of priority.

Influence the Capability Development Document

The Capability Development Document (CDD) is the key requirements document for all system designs, whether part of Joint Capabilities Integration and Development System, DoDI 5000.2 or 8, or UON or MTA. All DoD prototype development requires, at a minimum, an abbreviated CDD (A-CDD) as set forth by the Defense Acquisition Executive (DAE). This is the most critical point in the system design and development lifecycle to insert strategic DMSMS requirements. There are four mandatory Key Performance Parameters (KPPs) along with their associated Key System Attributes (KSAs) that must be included in all CDDs:

- Energy
- System Survivability
- Force Protection
- Sustainment.

There are two places in the A-CDD to insert DMSMS requirements:

1. The immediate insertion point is to add strategic DMSMS language to the Reliability

KSA section of the Sustainment KPP. The best solution here is to create a new KSA for obsolescence; however, this requires staffing through the Joint Requirements Oversight Council, which takes considerable time.

2. The other section of the A-CDD where strategic DMSMS language can be inserted is in "Other Logistics Considerations" but this location does not carry the same weight as the requirement in the Reliability KSA.

The following is sample language that can be inserted into either location:

"The system developer will identify subsystems where obsolescence of the technologies used poses a high risk. For the technologies identified, the system developer will develop a technology lifecycle roadmap that identifies the current technologies, including software, used in the system that are expected to become obsolete. The roadmap will categorize the technologies in technology segments of related equipment with similar lifecycles. The roadmap will forecast the introduction of new, mature technologies within each technology segment that could be used to update the prototype system design, improve its performance, add new capabilities, or meet new mission requirements that occur during prototype design, development and delivery. The roadmap will estimate the optimal time to introduce the new technologies into the system prototype design and development. The system developer will cost-effectively update the subsystems to remove the obsolete technologies prior to their becoming unsupportable in an ongoing manner through system design and delivery of the prototype to the government. The specific intent of this requirement is to optimize system readiness and minimize lifecycle cost in the prototype system design and delivery process."

Other Transaction Authority (OTA) RFI/RFP

The Request for Information (RFI)/Request for Proposal (RFP) for a prototype development project is another critical point in time where strategic DMSMS requirements can be inserted. An ideal situation would see strategic DMSMS requirements language as part of the RFI/RFP. This should take the form of inserted the language outlined into the RFI/RFP and should also be included in the Source Selection Plan (SSP) as an evaluation criterion. The importance of the DMSMS evaluation criterion must be stressed to the Source Selection Activity (SSA) and the Source Selection Evaluation Board (SSEB). The inclusion of the strategic DMSMS requirements language in the RFP is crucial, even if these evaluation criteria are not used by the SSA or SSEB. The following language from SD-26, "Contract Language Guidebook," helps develop the source selection criterion:

"Proposals shall be evaluated on the management approach and the adequacy of planning for mitigating DMSMS risks. Proposals that include DMSMS Management Plans defining their approach to Proactive DMSMS Management will receive more favorable ratings than those without such an approach. A Proactive DMSMS Management approach includes predictive forecasting strategies; Item list screening to the lowest level; Item list monitoring; matching of Items to the weapon system's environment across the vendor chain; methods for tracking, reporting, and mitigating DMSMS cases to avoid costly solutions; and a process to manage the Subcontractor's DMSMS efforts."

Other Transaction Authority Contract Requirements

The final place to insert strategic DMSMS requirements is in the actual DOTC (OTA) contract via Contract Data Requirements Lists (CDRLs) and their associated Data Item Descriptions (DIDs). However, even if strategic DMSMS requirements were not part of the source selection, they can still be added in the prototype acquisition contract. The following requirements can be found in the SD-26, "Contract Language Guidebook," sections. Please note: These requirements are also listed in importance to UON/MTA prototype design, development, and delivery so that they can be prioritized for negotiation during the contract adjudication process:

- Technology Management Plan (SD-26, table 1, #19, page 14) via DID DI-MISC-80508B, "Technical Report-Study/Service."
- Bill of Material for DMSMS Monitoring (SD-26, table 1, #5, page 7) via DID DI-MGMT-82274, "DMSMS Life Cycle Management Data."
- Health Assessment Report (SD-26, table 1, #20, page 14) via DID DI-MGMT-82273, "DMSMS Health Assessment Report." Note: this requirement should only be invoked at major Developmental Test (DT) milestones for decisions. A final DMSMS Health Assessment Report should be required at the point of delivery/transfer of the prototype to a Program of Record (POR). This Health Assessment will provide the following performance metrics (this percentage is notional and will be modulated in future contracts based on the impacts the unresolved issue parts have on Operational Availability):
  - An overall system DMSMS health measure, showing percentage of unresolved DMSMS issues.
  - The threshold for system health equals not less than 3% of all prototype configuration Items have current unresolved DMSMS issues.
  - Projected DMSMS issues expected to have a DMSMS effect within 2 years of the date of the report.
- As-Built Configuration List (SD-26, table 1, #22, page 15) via DI-SESS-81830, "As-Built Configuration List." Note: this requirement should be invoked at the point of delivery or transfer of the prototype to the POR so that a comparison can be performed between the bill of materials being monitored throughout the prototype design and development with the as-built configuration of the system at delivery, with any differences reconciled.

STRATEGIC PARTS MANAGEMENT TECHNIQUES

So far, we have discussed various ways to attempt to implement strategic DMSMS techniques into the Urgent Capability and MTA pathways but what about Parts Management you may ask? Smart parts selection can avoid DMSMS issues altogether! For those of you not familiar with the Parts, Materials, and Processes or PM&P domain, here are some key best practice tenets:

- Establish infrastructure to support rapid efforts
  - Establish data to characterize new technology for relevant application stresses
  - Applies to PM&P
  - Document details of typical application lifecycle stresses

- Data sharing is key
- System specifications must provide lifecycle detail to determine PM&P requirements

• Implement PM&P plans for rapid efforts
- Determine capability of needed technologies and document gaps early
- Should be known at start of the effort
- Develop a test and simulation approach to characterize performance
- At the start of the effort or within 3 months: critical for allocating test assets
- Utilize lessons learned to limit needless failures and integration issues
- Document for implementation at the start of the effort.

A PM&P program establishes the knowledge required for successful application of a new technology. Some critical factors are lifecycle stress profiles in the application, effects of different stress levels on performance (function and reliability), stress acceleration factors, supporting/enabling timely characterization and qualification testing, stressing dependent failure distributions in time, and analyzing environmental stress effects on reliability and function, to name a few. Yes, there is a lot to PM&P and the key is to establish a PM&P program before the start of a prototype development project. With a PM&P program in place, the project office can continuously

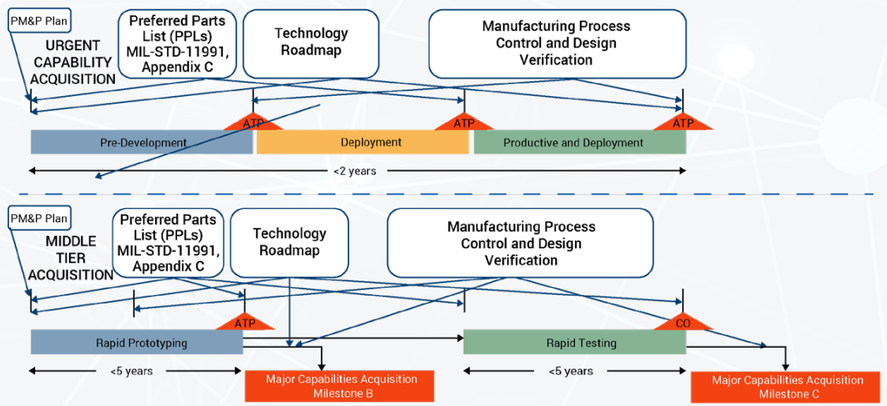

Figure 3. Strategic Parts Management in the Urgent Capability Acquisition and MTA Pathways

and proactively prepare for entering the Urgent Capability Acquisition and MTA pathways. It is understood that a "traditional" mindset will not serve us here. This is not by any means the status quo—these are new and innovative ways to do the business of prototype system development. These cultural obstacles, while important to discuss, are an article unto themself!

So, what can we do? We can try. *Figure 3* shows some of the PM&P techniques we can attempt to insert at the various milestone points in the Urgent Capability Acquisition and MTA lanes.

We discussed earlier about ways to insert strategic DMSMS requirements into the OTA contract via CDRLs/DIDs, so we can do the same for PM&P. Here are the three main PM&P requirements areas we would want to add to the RFP:

• Ensure Parts Selection and Qualification Discipline
- Government Approval of P&MP Plan via Contract Data Requirements List
  • MIL-STD-3018 Plan Data Item: DI-SDMP-81748
  • MIL-STD-11991 Plan Data Item: DI-STDZ-81993

• Ensure Access to Parts (Materials and Critical Processes) Design Lists
- Same CDRLs for Plans Provide Design Lists
  • DI-SDMP-81748: Parts Lists
  • DI-STDZ-81993: Parts, Materials, and Critical Processes Lists

• Utilize Lessons Learned
- MIL-STD-11991, Appendix C, Items with Restricted Use
- Many Documented by Industry Standards.

CONCLUSION

When we began, it seemed as if the new Urgent Acquisition and MTA pathways put in place by DoDI 5000.8 were challenges for DMSMS and Parts Management. In fact, these new pathways represent amazing opportunities to insert strategic obsolescence and Parts Management methods, techniques, tools, and best practices. By seizing the opportunity to get involved in the early prototype system design, we have the best chance of success to "design out" by applying DMSMS and smart Parts Management best practices. The Army is already stepping up the use of these two new pathways and developing major weapon system capabilities for the future fighting force. Due to the rapidly changing global threats and military modernization of our near-peer adversaries, it is envisioned that all the Joint services will also be using the Urgent Capability and MTA acquisition pathways. By employing some or all of the concepts and techniques espoused in this article, this is a fight we can win!

Contracting for Diminishing Manufacturing and Material Shortages and Parts Management

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The Department of Defense (DoD) has relied on commercial enterprises to supply its weapon system needs since its inception. While, at times, the government has done some of that work internally, nearly every weapon system we use is currently built commercially. As an example, the last warship constructed in a public yard was a submarine built at the Portsmouth Naval Shipyard, the USS *Sand Lance*, SSN-660, delivered in 1969, and commissioned in 1971. A scan of the FY20 budget request[1] shows that contractors are currently supplying all the major weapon systems procured by DoD. *Figure 1* displays the cost and distribution of those systems across DoD from that budget request. While DoD buys its weapon systems commercially, it is not necessarily doing the best job at it. DoD Weapons System Acquisition has been on the Government Accountability Office (GAO) High Risk List since 1990.[2] A recent GAO report recognizes that progress has been made but there is still substantial risk and room for improvement. There is no question that contracting is complex and difficult and, when discussing multibillion-dollar projects that last many years and result in small quantities of very long lifecycle equipment, complexity is greatly magnified. One author explains the need for "…flexibility within what is necessarily and inherently a strict rules-based process…"[3] with room for both art and science in acquisition contracting. This article does not imply that either contracting or DMSMS is the cause of all the problems in acquisition, but rather, points to some ways that our part of the overall problem can be alleviated.

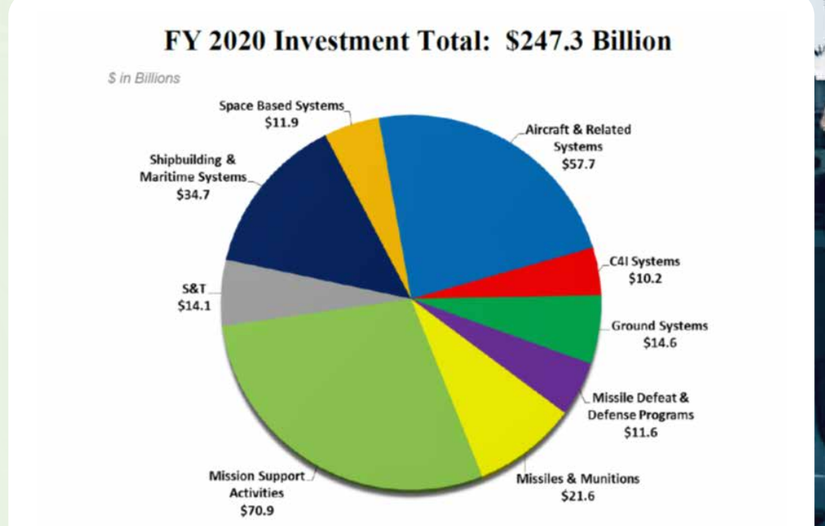

Figure 1. Cost and Distribution of DoD Major Weapon Systems

Most weapon systems are built in relatively small quantities,[4] especially when compared to the production of automobiles. Almost all major platforms have fewer than 1,000 fielded systems (many have less than 100), whereas it is unusual to see less than 100,000 units of a particular car model to be built in a year.[5] Life expectancy is quite different as well; automakers plan on a 10-year life for cars and the averages indicate that most cars last less than 13 years, whereas many weapon systems are expected to last twice that. These differences are just some of the drivers of DMSMS problems in military systems. Given these facts, maximizing our ability to reduce the number of DMSMS events and minimize their impacts should be a part of our acquisition and sustainment contracting strategies.

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. Parts Management is an integrated effort to streamline the selection of preferred or commonly used parts during the design of weapon systems and equipment under an overarching Systems Engineering framework. DMSMS and Parts Management are related areas within the overall acquisition and sustainment process. They require robust parts selection early in the design phase and both can have negative effects on cost during acquisition and sustainment. Both are also areas that often suffer from a lack of attention during the contracting process.

In October 2019, DSPO published SD-26, "DMSMS Contracting Language Guidebook,"[6] to assist programs with this area of contracting. DSPO is currently sponsoring efforts to add Parts Management to SD-26. The process of developing SD-26 involved DMSMS management, contracting, and logistics personnel from all the services. Prior to finalizing the document, all available literature and existing Data Item Descriptions (DIDs) were reviewed. When needed, new DIDs were developed to ensure that the data needed

[1] Office of the Under Secretary of Defense (Comptroller)/Chief Financial Officer, United States Department of Defense Fiscal Year 2020 Budget Request, Program Acquisition Cost by Weapon System, March 2019, https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2020/fy2020_Weapons.pdf.

[2] U.S. GAO, *GAO Report to Congressional Committees, High-Risk Series, Substantial Efforts Needed to Achieve Greater Progress on High-Risk Area*, March 2019, p. 143, https://www.gao.gov/assets/700/697245.pdf.

[3] Federal Computer Week, "Federal Acquisition: Art or Science?" Mike Hettinger, August 27, 2014, http://fcw.com/articles/2014/08/27/federal-acquisition-art-or-science.aspx.

[4] https://en.wikipedia.org/wiki/List_of_equipment_of_the_United_States_Armed_Forces.

[5] https://en.wikipedia.org/wiki/List_of_automobile_sales_by_model.

[6] SD-26: https://quicksearch.dla.mil/qsDocDetails.aspx?ident_number=283456.

for good DMSMS management could be contractually obtained. The final draft product was reviewed by teams from the Aerospace Industries Association, the National Defense Industrial Association, and the DoD DMSMS working group membership. The team reviewed all the comments and suggestions, incorporating many of them in the final product. Similar rigor is being applied to the Parts Management additions.

SD-26 contains a section with contract language broken down by various functions, then further categorized by their utility in different acquisition phases and DMSMS management approaches. The last section offers guidance on developing Contract Data Deliverable Lists (CDRLs) specific to DMSMS management. Several matrixes enable the user to select which sections to use in different contracting scenarios. While it is not the intention of SD-26 to provide cut-and-paste contract language, it is a good source of material to guide the development of sound contracts. Good contracts reflect the intent of the program's acquisition and sustainment strategy and leverage the specific capabilities of the contractor.

It is never too early or too late to start managing DMSMS proactively. Ideally, the request for proposal (RFP) for designing a new system should contain the program's expectations for DMSMS management, including parts selection and the overall approach to DMSMS management. From a performance-based perspective, the program should lay out requirements for what percentage of DMSMS will be allowed and require contractors to detail how they plan to achieve those requirements in their response to the RFP. From a prescriptive contracting perspective, the program could require the contractor to follow

certain standards, such as IEC 62402 and/or SAE STD-0016, and regularly report their efforts and demonstrate their performance. The bottom line is that DMSMS should be a consideration when each part is selected, and the part selected should have the longest lifecycle possible while still meeting the myriad of other system requirements. When a part's anticipated lifecycle is shorter the system lifecycle (which is typically the case) mitigations should be considered and recorded. As a program moves from the design phase, part monitoring and case management should be included in contracts throughout the anticipated system life.

This may seem obvious, but it is unreasonable to expect a contractor to perform tasks that are not clearly defined in the contract and for which they are not paid. Good contracts ensure that expectations are clear on both sides of the table and provide (and define) a path for successful completion to the satisfaction of both parties. SD-26 is a tool that the DMSMS community can use to improve contracts. The anticipated parts management additions will add value to the document and further the cause of improving weapon system acquisition.

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CLCL 014 Parts and Material Lifecycle Management Credential

Primary Integrated Product Support Element: Sustaining Engineering (Planned Go-Live Date: September 30, 2021)

The Department of Defense (DoD) Lifecycle Logistics Workforce Transformation Team convened in December 2019 to define new Defense Acquisition Workforce Improvement Act–certification requirements for the community in support of a future restructuring of the DoD lifecycle logistics functional community. The team identified requirements for 15 multidisciplinary, competency-based credentials that address each of the 12 Integrated Product Support elements outlined in Appendix A of the DoD Product Support Manager's Guidebook. The transformation team worked with the DoD Diminishing Manufacturing Sources and Material Shortages (DMSMS) and Parts Management lead at the Defense Standardization Program Office and her team to ensure recommended DMSMS, Parts Management, and related interdisciplinary courses were included as one of these new credentials. When deployed in September 2021, CLCL 014 will be available to workforce members from any defense acquisition workforce functional community, including lifecycle logistics, systems engineering, production, quality and manufacturing, and program management. It will include an outcome-based, scenario-based, demonstrated proficiency-based end-of-credential assessment.
The total time to complete the 13 online-training modules (see on the right) is approximately 34 hours, excluding the end-of-credential assessment. Additional information on the new Defense Acquisition University (DAU) credentialing program is available at https://www.dau.edu/training/pages/credentials.aspx.

In addition to CLCL 014, two other DAU credentials include Parts Management or DMSMS courses: CLCL 006 Designing Supportable Systems, which includes LOG 0630 Introduction to Parts Management, and CLCL 003 Supply Chain Integration, which will include LOG 0650 DMSMS Fundamentals.

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Program News

Topical Information on Standardization Programs and People

PMMC 2021

The DMSMS Conference is now the **Parts and Material Management Conference (PMMC)**. The new name reflects the evolving focus of the conference to include additional aspects of Parts Management and to reflect the management of parts and materials through the total life cycle of systems. The conference is planned for December 13-16, 2021 in Denver, Colorado, at the Gaylord Rockies Resort & Convention Center. The theme this year is "Ensuring Sustainable Systems through DMSMS and Parts Management Excellence." There will be plenary sessions, training, technical sessions, breakouts, and exhibits, all aimed at providing insights into making your system sustainable through the lifecycle. Qualified attendees (active U.S. military, government, or employees with a current DD2354 on file) also will be able to attend the concurrent Defense Manufacturing Conference at no additional expense, giving access to more technical information for the same travel cost. For more information on the event, go to www.PMMCmeeting.org.

Defense Standardization Program

JOURNAL

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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.

The following is our theme for the upcoming issues:

Issue	Theme
May—August 2021	Standardization Stars
September—December 2021	Modular Open Systems Approach II


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