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## Introduction

Relax. Now imagine a perfect world where every program has the ability to minimize unanticipated negative cost and schedule impacts. How? Through the selection and proactive monitoring of the parts embedded in a system's design. Not possible? Well, stop imagining and see that there are, in fact, two communities that exist and should be leveraged to help DOD programs do just that. The communities are the parts management and diminishing manufacturing sources and material shortages (DMSMS) management.

What's that? You are not familiar with these two communities and their management processes? Definitions for both can be found in the boxes on this page, but more important than definitions is what they can do for a program office and the development, production, and sustainment of its system.

Parts management benefits a system by ensuring that parts are selected for a system design to reduce its life cycle cost and logistics footprint.

DMSMS management benefits a system by identifying and resolving obsolescence issues before there is an opportunity for those issues to impact cost, schedule, and readiness.

However, an even bigger payoff in terms of weapon system affordability, supportability and logistics readiness can be attained when both of these communities perform effectively and in conjunction with one another. This article will explore the responsibilities of each of these communities throughout the life cycle, as well as a number of enabling activities that support these roles. With this information, program management should be able to gain an understanding of how these two communities should be used synergistically to help meet its program's cost, schedule, and readiness goals.

### PARTS MANAGEMENT

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.

Source: SD-19, "Parts Management Guide," December 2013.

### DMSMS MANAGEMENT

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," January 2015.

**Parts/DMSMS Management Roles and Responsibilities throughout the Program Life Cycle**

To avoid confusion, in some (but not all) companies, the DMSMS and parts management functions are handled by a single organization. When that is the case, the differentiation between the two communities is somewhat artificial. Within DOD, however, the authors are unaware of any situation in which the two functions are handled by the same community or organization. Consequently, the distinction between the relative roles and responsibilities is acute.

Parts/DMSMS management roles operate in parallel over the entire program life cycle. Acquisition programs benefit most when both parts management and DMSMS management begin early in the system life cycle. However, their respective roles and responsibilities, which at times are similar, do evolve over time (see exhibit).

Carrying out these Individual roles and responsibilities improves program affordability. For example, take parts management. Avoiding new parts avoids costs. For each part, there is an average cost avoidance of $27,500 for *not* adding a new part into inventory (according to the SD-19). As a result of effective parts management, the Virginia class submarine program was able to significantly reduce the number of new parts introduced into the supply system (see box) relative to prior submarine programs.

> Prior class design and construction suffered from parts proliferation. The Trident class required 28,000 procured parts, the Los Angeles class called for 29,000 procured parts, and the Seawolf class lead ship construction required 45,000 procured parts. In contrast, the initial issue of drawings for the Virginia class called for 17,963 procured parts.
>
> Over the life of the Virginia class program, $27M invested in parts standardization is projected to lead to $789M in cost avoidance.
>
> Source: Defense Standardization Program Case Study: The Virginia Class Submarine Program, Defense Standardization Program Office, undated.

From a DMSMS management perspective, the Virginia class submarine program initiated a robust, proactive program early in the design build process. While some DMSMS is evitable, carrying out its proactive roles and responsibilities leads to cost avoidance (see box) because the earlier a DMSMS issue is identified, the longer the window of opportunity to

> The Virginia class program office established a technology refreshment integrated product team (IPT), formalized a standard operating procedure, developed a memorandum of agreement with the Naval Supply Systems Command for the advanced procurement of spares, and established a budget. As a result, the program has resolved more than 1,260 obsolescence issues and reaped more than $159M in documented cost avoidance by being proactive since inception.
>
> Source: Standardization Document (SD)-22, "Diminishing Manufacturing Sources and Material Shortages: A Guidebook of Best Practices for Implementing a Robust DMSMS Management Program," January 2015.

resolve it. But since a long window of opportunity generally allows for more low-cost resolution options, as compared to a short window of opportunity, more costs are avoided.

Closer working relationships between these two communities could increase their effectiveness. When the parts management community establishes part selection criteria, DMSMS considerations play a prominent role. After the engineering community tentatively selects parts (either for an initial design, a redesign to resolve an obsolescence issue, or another type of system modification), the DMSMS community should be given the new parts lists or bills of material (BOMs) or changes to existing parts lists or BOMs. DMSMS practitioners review the new parts for both current obsolescence and future obsolescence risk. If there is an issue serious enough that another part should be selected, the DMSMS community should work with the parts management community and ultimately with design engineering to identify an alternative.

Of course, there is a question of how well working relationships between these communities and designers actually work. The better the integration, the greater the benefit to program offices. The following section looks at some common enabling activities and raises questions about better interfaces between the two communities.

## Technology Maturation and Risk Reduction Phase

***Parts Management Best Practices***

- Preliminary parts management plans should be developed
- Although parts management requirements for prototypes are not anticipated, architecture and technology decisions affect part selection
- All initial determinations and collaborations between the acquisition activity and the contractors concerning the parts management requirements as stated in MIL-STD-3018 (including the a requirement to establish procedures for obsolescence management) should be considered in the development of preliminary designs before Milestone B

***DMSMS Management Best Practices***

- The technology development contractors and their subcontractors along with the DOD program office in an oversight role should develop designs for prototypes that are resistant to DMSMS issues by employing DMSMS design considerations
- DMSMS management plans should be developed
- To the extent that part selection is done, the contractors should be required to deliver parts lists to the government
- All high-risk parts should be monitored for actual or pending DMSMS issues; results should be identified to the government program office; and plans should be developed to eliminate these parts as the design matures

## ENGINEERING and Manufacturing Development Phase

***Parts Management Best Practices***

- Requirements as stated in MIL-STD-3018 should be implemented under an approved parts management plan
- Requirements should be flowed down to subcontractors, and the contractor should review their processes for approval
- As subcontractors come "on line," they should implement their approved parts management process

***DMSMS Management Best Practices***

- A prime contractor and its subcontractors along with the DOD program office in an oversight role should develop designs for prototypes that are resistant to DMSMS issues by employing DMSMS design considerations
- DMSMS management plans should be updated
- Contractors should be required to deliver bills of material (BOMs) to the government
- All high-risk parts should be monitored for actual or pending DMSMS issues; results should be identified to the government program office, and plans should be developed to replace these parts before production begins

## Production and Deployment Phase

***Parts Management Best Practices***

- Required for changes or modification to the baseline design, such as value engineering changes or parts obsolescence issue resolutions

***DMSMS Management Best Practices***

- A prime contractor and its subcontractors along with the DOD program office in an oversight role should develop designs resistant to DMSMS issues by employing DMSMS design considerations for new designs and engineering change proposals
- DMSMS management plans should be updated
- Contractors should be required to deliver updated bills of material (BOMs) to the government
- All high-risk parts should be monitored for actual or pending DMSMS issues; results should be identified to the government program office, and plans should be developed and funded to resolve DMSMS issues before production is impacted

## Operations and Support Phase

***Parts Management Best Practices***

- Required for changes or modification to the baseline design, such as value engineering changes or parts obsolescence issue resolutions

***DMSMS Management Best Practices***

- DMSMS management plans should be updated
- Contractors should be required to deliver BOMs for system changes and checking new designs for DMSMS resilience
- All high risk parts in the BOMs should be monitored for actual and pending DMSMS issues
- Monitoring should be conducted by support contractors and/or government program offices as a function of the life cycle support plan. When contractors are monitoring, actual and pending DMSMS issues should be identified to the government program office. The government program office overseas all contractor DMSMS management activities
- Plans should be developed and funded to resolve DMSMS issues before they impact the system

**EXHIBIT: PARALLEL ACTIVITIES OF PARTS MANAGEMENT AND DMSMS COMMUNITIES BY ACQUISITION PHASE**

**Enabling Activities in Support of Roles and Responsibilities**

***Contract Language***

Both DMSMS and parts management guidance provide numerous best practices to help perform these roles and responsibilities. Both communities have established preferred contract language. In the case of parts management, contract requirements are contained in MIL-STD 3018. Although there is a requirement for proactive DMSMS management in MIL-STD-3018, additional requirements may be needed to ensure that best DMSMS management practices are performed (e.g., materials and chemicals, transfer plans, health reports, metrics, etc.). While the SD-22 contains some more expansive contract language examples, an effort is now underway to establish preferred contract requirements, corresponding contract language, and associated data item descriptions (DIDs) and contract data requirements lists (CDRLs). These two approaches to contract language have been pursued independently. *Would a joint approach to combine DMSMS and parts management contract requirements into fewer independent contract clauses be a good idea?*

***Plans***

Plans that summarize key activities and are updated throughout the life cycle are an important aspect of both parts and DMSMS management. While the plans have a similar structure, there are important differences. The parts management plan described in the SD-19 is a tactical plan written by industry for industry. There is no parts management plan written by the government for the government, because the government does not design the system. The DMSMS management plan described in the SD-22 is written by the government for the government. It is generally more strategic than tactical, but individual program offices may tailor it to their needs. Industry's tactical DMSMS management plan is described in SAE 0016[1] and should be aligned with the government's plan. *Should there be closer integration among the plans?*

[1] SAE Standard 0016, Standard for Preparing a DMSMS Management Plan, 1 August 2011.

***Teams***

Both communities carry out activities with a multidisciplinary team composed of people with similar functional expertise. Again, there are differences. The parts management team described in the SD-19 is an industry team. While there will be a government point of contact (POC), there is usually no formal parts management government team. The Virginia class program adopted a more aggressive parts management approach (see box).

> The program established a Parts Standardization Board—more than two years before completion of the ship specifications—to identify, implement, and maintain a parts standardization program. The board, the gatekeeper of allowable parts, functions under the direction of program management and has members from the engineering, design, materials, planning, quality, and operations departments. A team leader reports directly to the program manager to ensure that standardization goals are maintained. In addition, the shipbuilder's president signed and supports the standardization policy and procedures. Finally, the shipbuilding specification directs the use of standard parts. The use of standard parts is tracked as a technical performance measure throughout design and construction.
>
> Source: Defense Standardization Program Case Study: The Virginia Class Submarine Program, Defense Standardization Program Office, undated

The DMSMS management team described in the SD-22 is a government-led team that meets regularly, including industry participation to the extent required by the contract. Industry's internal DMSMS management team is not described in the SD-22; its structure may be similar to industry's parts management team. For the Virginia class submarine, the DMSMS management team was included in its technology refreshment integrated process team (see box).

> The team identifies obsolescence issues affecting the Virginia class submarines before they impact ship construction and develops timely solutions. The team's approach has the following elements:
>
> - Identify obsolescence issues early, using the Obsolescence Management Information System (OMIS™) or via vendor monitoring efforts
> - Notify stakeholders that an issue has been identified
> - Identify all systems affected
> - Select a solution
> - Execute the solution
> - Measure and report results to ensure consistency and repeatability
>
> Source: Defense Standardization Program Case Study: Obsolescence Management for Virginia Class Submarines, Defense Standardization Program Office, undated

There is, however, no direct interface between industry's parts management team and the government DMSMS management team. *How does the necessary communication take place?*

***Systems Engineering Design Considerations***

DMSMS management and parts management are both system engineering design considerations. According to the Defense Acquisition Guidebook (DAG), parts management is a standardization design strategy available to program managers. Benefits of parts standardization include:

- Reducing the number of unique or specialized parts used in a system (or across systems)
- Reducing the logistics footprint
- Lowering life cycle costs

In addition, parts management can enhance the reliability of the system and mitigate part obsolescence due to DMSMS. For DMSMS, the DAG identifies practices that the program should consider to minimize DMSMS risk throughout the life cycle of the system:

- Avoid selecting technology and components that are near the end of their functional life
- During the design process, proactively assess the risk of parts obsolescence while selecting parts
- When feasible, use an Open Systems Architecture to enable technology insertion/refreshment more easily than with design-specific approaches
- Proactively monitor supplier bases to prevent designing in obsolescence

*How well do the design interfaces work? Could the communities be better integrated to increase their influence on the design?*

***Supply Chain Integration***

Supply chain integration encompasses new product development, technology, procurement, strategic sourcing, quality, technical data, inventory and demand management, and supply chain risk management. In nearly every one of these elements, parts management concerns and DMSMS concerns are very closely related. DMSMS and parts management are key elements of supply chain integration; their contributions are quite similar in concept.

For example, for the technical data element of supply chain integration, parts management is concerned with using technical data to assure that the part can perform in a way that meets all requirements. DMSMS management is concerned with having sufficient technical data to allow for monitoring for obsolescence and resolving issues if an item can no longer be procured. For the Virginia class submarine, the management of technical data was standardized (see box).

> The user interface for more than 600 interactive electronic technical manuals is standardized, allowing sailors to work across multiple systems and ships within the class—a first for submarines. Also, standardized technical documentation, including all of the ship’s drawings, is integrated with the supply-ordering process and with onboard training products.
>
> Source: Defense Standardization Program Case Study: The Virginia Class Submarine Program, Defense Standardization Program Office, undated

Proactive DMSMS management and robust parts management decrease supply chain risk. Robust supply chain integration reduces DMSMS risk. Again, some questions on efficiency can be raised. *Is there duplication of effort and sufficient communication at the tactical level? Are the interactions among headquarters offices sufficient? Are these subjects sufficiently addressed in policy and guidance?*

**Conclusions**

DMSMS management and parts management are closely connected, as evidenced by the following:

- They complement each other throughout the life cycle
- They both require plans, operate in teams, and rely on contract language
- They reinforce each other as design considerations
- They both have strong connections to supply chain integration

There are however questions concerning the efficiency and effectiveness of those connections, as well as connections to other activities, especially design. Are there ways to improve how each is managed by better leveraging their synergies to answer the following?

- To what extent do the desired interactions of the two communities in program offices reflect reality?
- How can the program office teams, plans, and contract language be better integrated?
- Is there any duplication of effort or lack of communication that can be avoided in program offices?
- Can communication be improved at the headquarters level?
- Are changes needed to parts/DMSMS management policy, guidance, training, or outreach?

An important step has been taken to pursue the answers to these questions with the appointment of a single individual to lead both functions within the Defense Standardization Program Office (DSPO), reporting to the systems engineering office in the Office of the Secretary of Defense. According to Mr. Greg Saunders, the DSPO Director, this change "recognizes and acknowledges the close cooperation and interrelationships of DMSMS and Parts Management. A systems engineering approach integrates these two closely related programs bringing to life the well-worn phrase, 'the whole is greater than the sum of the parts.' Each program has made significant contributions in the past – putting them under the same OSD program lead is a logical next step that should produce even greater efficiencies for our weapon systems programs."

But by itself, this step is not sufficient. Program offices will only benefit if program leadership takes action to ensure that government and industry parts and DMSMS management practitioners not only do their job in a robust manner, but also have their recommendations given priority by other engineers and logisticians in the program office.

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**14. ABSTRACT**
The diminishing manufacturing sources and material shortages (DMSMS) management and parts management communities within government and industry generally operate as independent functions that seek to minimize the impact on life cycle cost, schedule, and readiness; and reduce the logistics footprint. However, an even bigger payoff, in terms of weapons system affordability and logistics readiness, can be attained when both of these communities perform effectively and in conjunction with one another. This article will explore the responsibilities of each community throughout the life cycle, as well as a number of enabling activities that support these communities' roles. This information provides program management with an improved understanding of how these two communities should be used synergistically to greatest effect on program cost, schedule, and readiness goals.

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