



INSTITUTE FOR DEFENSE ANALYSES

**Diminishing Manufacturing Sources and
Material Shortages (DMSMS) Fundamentals**

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About This Publication

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Executive Summary

Diminishing manufacturing sources and material shortages (DMSMS) management is a multidisciplinary process to identify risks resulting from obsolescence, loss of manufacturing sources, or material shortages; to assess the potential for negative impacts on schedule or readiness; to analyze potential mitigations; and then to implement the most cost-effective resolution. Parts management is an engineering discipline for selecting parts for use in a Department of Defense system (or equipment) and take into account considerations that affect the design, production, operation, support, and disposal throughout the life cycle of the system. In March 2022, a Parts and Material Management Conference (PMMC) will cover both topics. The Institute for Defense Analyses (IDA) prepared or substantially helped craft seven briefings for this event.

Three of the briefings will be used for training; they will be presented by DOD practitioners.

- Standardization-related Document (SD) 22 is DOD's overarching DMSMS guidance. DOD published an updated SD-22 (written by IDA) in January 2021 and IDA is preparing another update. NS D-32993 is a substantially modified three-hour training course on the SD-22 processes.
- Development of a DMSMS Management Plan (DMP) is an important early step in DMSMS management. The January 2021 and forthcoming SD-22s formalized DMP development guidance. NS D-32973 is new DMP preparation training.
- DOD prime contractors perform many DMSMS procedures and even more parts management procedures. NS D-32996 makes minor revisions to existing training on DMSMS contracting and adds preliminary parts management contracting material.

IDA will present the remaining four briefings in technical sessions. These briefings cover the results of specific subtasks from several IDA projects performed in the last two years.

- NS D-32929 provides a detailed explanation of often-misunderstood DMSMS management interfaces with product, product improvement, supportability, and technology roadmaps. This material is a large part of the forthcoming SD-22 revision.

- NS D-32956 describes how to improve the content of manufacturing readiness assessments (MRAs) through a more rigorous consideration of DMSMS management and parts management in the assessment criteria. MRAs are regulatory requirements throughout DOD's acquisition process.
- NS D-32930 delves into cybersecurity and hardware assurance (HwA) considerations associated with implementing resolutions to DMSMS issues. IDA will also moderate a plenary panel on this subject at the PMMC. IDA plans to use these events to help formulate future policy recommendations.
- NS D-32962 defines new DMSMS resolutions and estimates their average cost. These changes contribute to a more accurate estimate of cost avoidance from proactive DMSMS management and also provide program offices with an initial estimate of resolution cost when no other information is readily available.

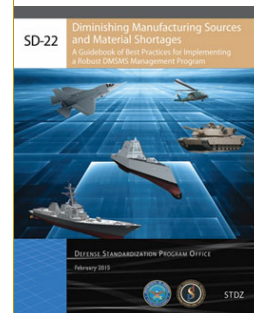


Diminishing Manufacturing Sources and Material Shortages (DMSMS) Fundamentals

An Overview of the SD-22:
A Guidebook of Best Practices for Implementing
a Robust DMSMS Management Program

Course Agenda

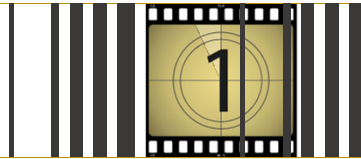
- Lesson 1– Introduction
- Lesson 2 – DMSMS Management Policy and Guidance
- Lesson 3 – DMSMS Management Program Infrastructure
- Lesson 4 – DMSMS Monitoring and Surveillance
- Lesson 5 – Resolution Need, Timing, and Level
- Lesson 6 – DMSMS Resolution Determination
- Lesson 7 – Implement DMSMS



Course Parallels SD-22 Chapters

Lesson 1 – Introduction: Overview

- DMSMS Definition and Inevitability
- DMSMS Mechanisms
- What Is DMSMS Management and Its Importance
- Overview of the DMSMS Management Process



What Is DMSMS?



- The loss or impending loss of manufacturers or suppliers of items, raw materials, or software:
 - Caused by competitive, regulatory market factors leading to
 - Supplier or manufacturer going out of business
 - Supplier or manufacturer discontinuation of the product
 - Caused by the item or software no longer performing the function for which it was intended due to other changes in the system
- DMSMS issues can arise in any component within a system

DMSMS Is Inevitable



- DOD systems can require a decade or more to develop and then have a fielded life that spans decades
- Yet the life cycles of many items that make up a DOD system's design are brief by comparison:
 - As low as 18 months for COTS* and hardware–electronic items
 - Approximately 5 years for COTS software
 - Environmental or regulatory restrictions can happen at any time

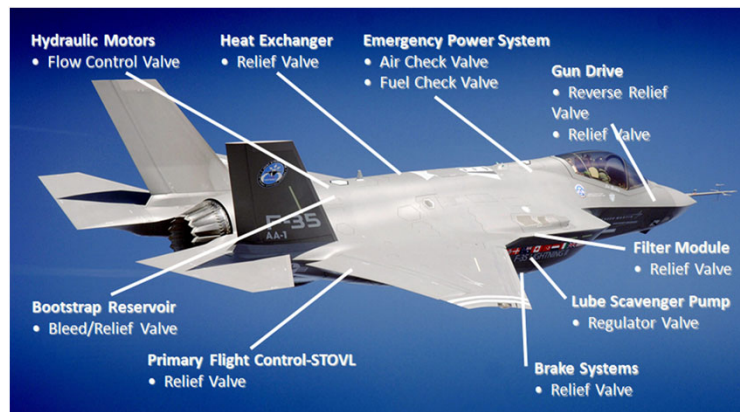
* Commercial-off-the-shelf

DOD systems have long lives, while the parts that make up their designs have much shorter life cycles

DMSMS and Military Systems



- DMSMS issues can impact the availability of systems and their hardware and software components



DMSMS Mechanisms



- Market factors and regulation changes can result in first-order obsolescence
 - This occurs when hardware can no longer be purchased and software becomes more difficult to use
 - For identified obsolescence issues, a first order hardware or software change may need to be pursued
- Lower, functional-order obsolescence results from changes to hardware or software, based on either:
 - First-order hardware and software changes
 - Proactive technology refresh or software upgrades that have been implemented to address potential obsolescence

Hardware – Materials and Structural, Mechanical, & Electrical (MaSME) Items



- Factors influencing the occurrence of DMSMS issues:
 - Use of hazardous materials
 - The supplier goes out of business
 - The supplier's business case is no longer viable
 - Use of supply-constrained materials
 - The tooling is no longer available

What Is DMSMS Management?



- 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 to schedule and/or readiness
 - Analyze potential mitigation strategies
 - Implement the most cost-effective resolution strategy

Importance of DMSMS Management



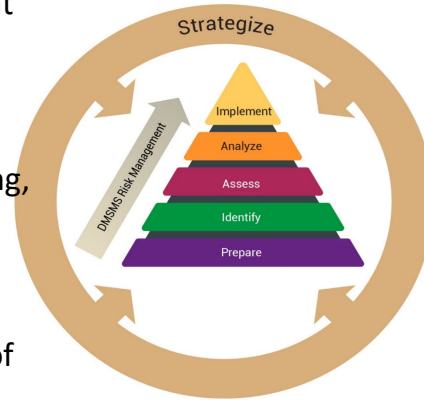
- DMSMS management objectives are to *cost-effectively and efficiently*:
 - Ensure DMSMS resilience during design
 - Minimize the scope of DMSMS-related out-of-cycle redesigns when they cannot be eliminated or avoided
 - Eliminate DMSMS-related production schedule impacts
 - Eliminate readiness degradations caused by DMSMS issues

Robust DMSMS management minimizes the impact to cost, schedule, and performance

Overview of DMSMS Management Process



- **Prepare:** DMSMS management program infrastructure
- **Identify:** DMSMS monitoring and surveillance
- **Assess:** Resolution need, timing, and level
- **Analyze:** DMSMS resolution determination
- **Implement:** Implementation of DMSMS resolutions



Strategic processes weave throughout these steps, offering opportunities to delay or prevent the occurrence of DMSMS issues and increase the likelihood of low-cost resolutions available for implementation.

DMSMS management is a dynamic process and it never ends

Lesson 2 – DMSMS Management Policy and Guidance: Overview

- DMSMS Management Policy
- DMSMS Management Guidance throughout the System Life Cycle



DMSMS Management Policy

2

- High-level policy
 - DOD Instruction 5000.85, *Major Capability Acquisition*
 - DOD Instruction 5000.91, *Product Support Management for the Adaptive Acquisition Framework*
 - DOD Instruction 4140.01 *DOD Supply Chain Materiel Management Policy*
 - DOD Manual 4140.01, Volume 3, *DOD Supply Chain Materiel Management Procedures: Materiel Sourcing*
- Detailed policy
 - DOD Instruction 4245.15, *Diminishing Manufacturing Sources and Material Shortages (DMSMS) Management*

These policies establish that it is the responsibility of the services and acquisition programs to detect DMSMS issues and prevent or mitigate their impacts on systems

Detailed DMSMS Management Policy

2

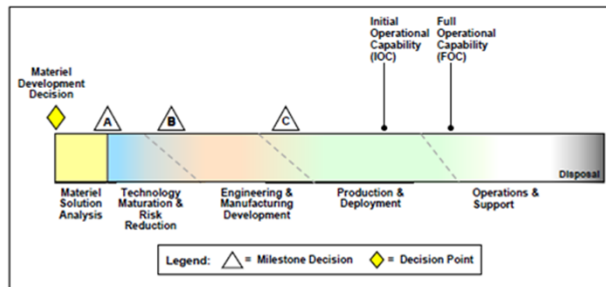
- Per DODI 4245.15, DOD policy is to:
 - *Establish and implement risk-based, proactive DMSMS management throughout the life cycle of all DOD items.*
 - *Evaluate all DOD system designs and redesigns for potential DMSMS issues that could arise during the life cycle of a DOD item.*
 - *Implement resolutions if necessary to minimize or eliminate risks and negative impacts (e.g., cost, schedule delays, readiness) from DMSMS issues throughout the life cycle of DOD items*
 - *Implement improvements to DMSMS management processes throughout the life cycle of all items across the DOD enterprise.*
- DMSMS management responsibilities and procedures are also identified

On 5 November 2020, DODI 4245.15 went into effect as the Department's specific, stand-alone DMSMS management policy

DMSMS Management Guidance throughout the System Life Cycle

2

- DODI 5000.85, Major Capability Acquisition (MCA)
 - MCA is one of several acquisition pathways
 - In the past, DMSMS management-related policy has primarily been associated with the MCA pathway



A life-cycle focus requires DMSMS management considerations for system development and system sustainment

DMSMS Management Considerations for System Development (1 of 2)

2

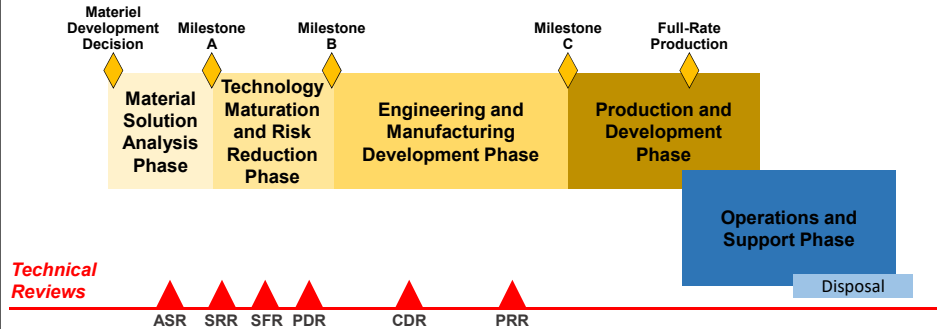
- Program managers and lead systems engineers have the responsibility for planning and execution of systems engineering for their program office
- Systems engineering activities that should take into account DMSMS management considerations are:
 - Systems Engineering Plans
 - Document that captures the technical risk, design considerations, and other systems engineering activities
 - Best practice: Incorporate DMSMS management and risk into appropriate sections of the SEP
 - Systems Engineering Technical Reviews (SETRs)

Program office leadership should begin considering DMSMS management activities early in the development of a system

DMSMS Considerations in Systems Development (2 of 2)

2

- Systems Engineering Technical Reviews (SETRs)
 - Evaluate technical maturity and risk of the system design at specific points throughout a system's life cycle
 - Affirm outputs of the acquisition phases
 - Affirm progress toward the next acquisition phase



DMSMS Management Considerations for System Sustainment (1 of 2)

2

- A variety of planning, implementation, and execution activities that support the sustainment of a system are encompassed by the term, life-cycle sustainment
- Life-cycle sustainment planning can:
 - Be used to maximize readiness; and
 - Provide product support at the lowest cost

Program offices should incorporate DMSMS management into their life-cycle sustainment planning

DMSMS Management Considerations for System Sustainment (2 of 2)

2

- Systems sustainment activities that should take into account DMSMS management considerations are:
 - Life-Cycle Sustainment Plans (LCSPs)
 - Documentation of the planning and execution of operation and sustainment for a system
 - Developed upon acquisition program initiation and maintained throughout the system life cycle
 - Given the inevitability of DMSMS issues and their mitigation, they should be incorporated in a program office's sustainment planning
 - Independent Logistics Assessments (ILAs)
 - Analysis of a program office's supportability planning
 - Conducted initially, early in a program and then repeated at milestones and other periodic times as the system design matures
 - Before fielding and during operations, DMSMS monitoring, assessment, and other activities should be part of ILAs

Program offices should incorporate DMSMS management into their life-cycle sustainment planning

Tailoring DMSMS Management Considerations for Different Acquisition Pathways (1 of 4)

2

- DMSMS management considerations apply to five of the six acquisition pathways:
 - Urgent Capability Acquisition (UCA) pathway (DODI 5000.81)
 - Middle Tier of Acquisition (MTA) pathway (DODI 5000.80)
 - Major Capability Acquisition (MCA) pathway (DODI 5000.85)
 - Defense Business Systems (DBS) pathway (DODI 5000.75)
 - Software Acquisition (SWA) pathway (DODI 5000.87)
 - Acquisition of Services pathway (DODI 5000.74)
- **The first four acquisition pathways** focus on hardware systems and their associated software; the fifth acquisition pathway focuses on software

Tailoring is required to apply DMSMS management to different acquisition pathways

Tailoring DMSMS Management Considerations for Different Acquisition Pathways (2 of 4)

2

- Tailoring DMSMS management to the generic activities of each of these pathways depends on:
 - The specific characteristics of the hardware system
 - The acquisition and sustainment strategies pursued
 - The prevalence and complexity of software within a system
 - The program office's tolerance for risk
- Several questions can assist in scoping DMSMS management planning:
 - What is the expected life cycle of the system?
 - What items should be monitored proactively?
 - To what extent will the program office rely on its major suppliers to conduct DMSMS management?

All program offices, regardless of acquisition pathway, should have a DMT responsible for developing and overseeing DMP execution

Tailoring DMSMS Management Considerations for Different Acquisition Pathways (3 of 4)

2

- Urgent Capability Acquisition (UCA) Pathway
 - Addresses the acquisition of a system that is required to be fielded, generally within two years; RDT&E funding limited to \$525M or less
 - Phases: pre-development, development, production and deployment, and operations and support
 - DMSMS considerations:
 - Generally short-lived systems
 - Minimal development effort/fewer opportunities to design in DMSMS resilience
 - Likely a high reliance on commercial items and assemblies; which items to monitor will be situation dependent
 - Technology roadmapping should begin by development phase
- Middle Tier Acquisition (MTA) Pathway
 - Applies to the acquisition of systems with a maturity level that enables fielding within 5 years
 - Phases: rapid fielding and rapid prototyping if warranted
 - DMSMS considerations:
 - Systems generally have a 5-year production phase and then in operations after that; sufficient time for DMSMS issues to arise; Additionally, if there is rapid prototyping, there may also be DMSMS issues
 - Likely a high reliance on commercial items and assemblies
 - Plan for technology refreshment when commercial support for items and assemblies no longer available and based on technology roadmapping

Tailoring DMSMS Management Considerations for Different Acquisition Pathways (4 of 4)

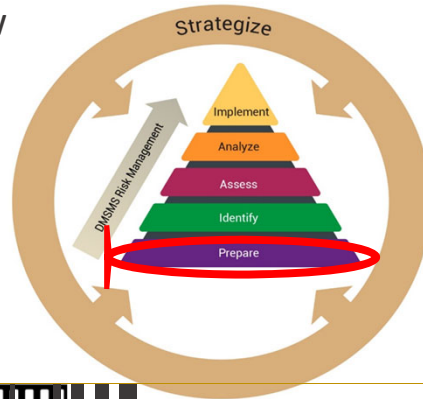
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- **Defense Business Systems (DBS) Pathway**
 - Applies to the acquisition of business capabilities; the most software-oriented of the four hardware-centric acquisition pathways
 - Phases: capability need identification; solution analysis; functional requirements and acquisition planning; acquisition testing and deployment; and capability support
 - DMSMS considerations (to begin during the third phase):
 - Generally long-lived systems
 - High reliance on commercial systems
 - Apply a risk-based approach to determine critical items to monitor
 - Plan for technology refreshment based on DMSMS issues and technology roadmapping
- **Software Acquisition (SWA) Pathway**
 - Applies to the acquisition of custom software
 - Phases: planning and execution
 - DMSMS considerations:
 - Functional obsolescence applies; monitoring for functional obsolescence should be the focus of DMSMS management effort

Take a break

Lesson 3 – DMSMS Management Program Infrastructure: Overview

- Establish the Foundations for DMSMS Management
- Develop a DMSMS Management Plan (DMP)
- Form a DMSMS Management Team (DMT)
- Establish DMSMS Operational Processes



The “Prepare” phase lays the groundwork for the other steps to be able to apply a risk-based approach to DMSMS management

Establish the Foundations for DMSMS Management (1 of 2)



- Refine and/or elaborate upon the four overarching objectives for DMSMS management
- Establish expectations for the program office’s DMT
- Establish risk-based, DMSMS management operating guidelines

A PM should establish the foundations for DMSMS management of the program office

Establish the Foundations for DMSMS Management (2 of 2)

3

- Program office leadership should address the following questions to refine its DMSMS management operating guidelines:
 - Which subsystems and items within those subsystems should have priority for monitoring?
 - When should DMSMS management begin?
 - How important is DMSMS management for software?
 - How should risk be taken into account?

DMSMS Management Plan (DMP), as required by DODI 4245.15

3

- A DMP:
 - Documents the foundations of a program office's DMSMS management approach
 - Identifies the risk of deviating from the DMSMS management processes documented
- DMPs should be:
 - Tailored to a program office's needs and resources
 - Implemented early in the life cycle
- The DMT develops the DMP; but the PM is ultimately responsible for approval of the DMP

DMPs are not static, but rather living plans that reflect a program office's changing circumstances

DMP Considerations (1 of 2)

3

- Purpose
 - The system/program office's near-term and long-term DMSMS management objectives
- Scope and availability
 - The program office/system(s) to which the plan applies
 - The AS, life cycle phase, and sustainment strategy, modification plans, and maintenance approach for each applicable system
- DMSMS management approach
 - Relative roles of program office personnel, contractors, and independent subject matter experts (SMEs)
 - Where to be reactive and proactive
 - Mechanisms to be used by the program office use for monitoring, assessing, analyzing, and performing case management
 - Contingency plans are in place for potential programmatic changes
- DMT
 - Stakeholders necessary for robust management of DMSMS issues
 - DMT member roles and who will serve in those roles?
 - Communication required of the DMT internally and externally

A DMP is not a tutorial. It should include only how the program office will perform its DMSMS management activities.

DMP Considerations (2 of 2)

3

- DMSMS management operations
 - Integration of DMSMS management efforts with other program office strategies, planning, and reviews
 - Level of DMSMS management intensity
 - Tailoring of DMSMS management processes
 - DMT oversight of contractor DMSMS management efforts
 - Detection, tracking and resolution of DMSMS issues
- Funding
 - Programmed and budgeted resources for DMSMS management operations
 - Programmed and budgeted resources for DMSMS resolutions
- Contract requirements
 - DMSMS management operations and resolution implementation requirements imposed on contractor and/or SMEs
- Metrics, reporting, and quality
 - Data elements collected by the program office
 - How data elements will be used
 - Program office expectations for Deliverables

DMSMS Management Team (DMT)

3

- The relationship between the DMT and DMP
 - The DMT develops and implements the DMP
 - The DMP documents the composition of the DMT and expands upon the DMT roles and responsibilities set by the PM or PSM
- The types of activities performed by the DMT include
 - Data collection
 - Development and implementation of DMSMS management processes
 - Production of deliverables for program office leadership
 - Reporting of metrics
 - Application of continuous improvement

A program office's PM or PSM charters the DMT and authorizes its activities

DMT Members

3

- Full or Permanent members
 - DMT lead
 - Program office representative
 - DMSMS subject matter expert (SME)
 - Engineering activity representative
 - Logistics representative
 - Sustainment and maintenance activity representative
 - Software SME
 - Supply support activity representative
 - Value engineering SME
 - Contracting office representative
 - Prime/subcontractor representative
 - Foreign military sales representative
- Ad-hoc members may be added as required

DMT Training Needs

3

- Not all DMT members are expected to be DMSMS SMEs
- All members of the DMT should be trained on their role
- DAU “Parts and Material Life Cycle Management” credentials program (forthcoming):
 - LOG 0640, DMSMS: What Program Management 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
 - LOG 0320, Preventing Counterfeit Electronic Parts from Entering DOD Supply System
 - LOG 0380, Provisioning & Cataloging
 - LOG 0390, Additive Manufacturing Overview
 - LOG 0470, Sustaining Engineering
 - CLL 051, System Retirement, Disposition, Reclamation, Demilitarization, Disposal (future LOG 0510)
 - CLC 004, Market Research (future designation TBD)
 - CLE 019, Modular Open Systems Approach (future designation TBD)
 - CLE 026, Trade Studies (future designation TBD)

Establish DMSMS Operational Processes (1 of 2)

3

- Operational processes support each of the five steps of the DMSMS management process
- Prepare
 - Establish the Foundations for DMSMS management *(already discussed)*
 - Develop the DMP *(already discussed)*
 - Form the DMT *(already discussed)*
 - Establish DMSMS operational processes
 - Secure resources for DMSMS management operations
 - Establish interfaces to advocate for DMSMS resilient designs
 - Establish a DMSMS management evaluation process
 - Establish a quality management system
 - Establish a case monitoring and tracking process
 - Establish supporting contracts.

The DMT establishes all the DMSMS management operational processes for the program office

Establish DMSMS Operational Processes (2 of 2)

3

- **Identify** (covered in a following section)
 - Prioritize systems
 - Identify and procure monitoring and surveillance tools
 - Collect and prepare item data
 - Analyze item availability
 - Assess preliminary designs for DMSMS risk
 - Forecast future DMSMS issues
- **Assess** (covered in a following section)
 - Obtain data needed for the assessment
 - Determine whether a resolution should be pursued
 - Assess resolution timing and level
- **Analyze** (covered in a following section)
 - Identify resolution cost elements
 - Identify and define resolution options
 - Determine the preferred DMSMS resolution
- **Implement** (covered in a following section)
 - Program and budget for DMSMS resolutions
 - Integrate DMSMS resolution and modification funding
 - Implement DMSMS resolutions

Prepare: Secure Resources for DMSMS Management Operations

3

- Operations funding is required to support contractor- and SME-performed DMSMS management activities for the program office, and the day-to-day functions of the DMT
- Drivers of operations funding:
 - DMSMS management initiation (one-time, start-up tasks)
 - Data collection and management, research, and forecasting (start-up and recurring tasks)
 - Data analysis and oversight (largely recurring tasks)
 - Some additional drivers related to the second and third drivers
 - Scope and level of effort for monitoring
 - Level of effort for assessment and analysis
 - Implementation oversight

Securing resources to support DMSMS management operations should begin early

Link between Resources Available and DMP

3

- If there is any mismatch between the DMSMS management foundations, the corresponding DMP, and the resources available to support DMSMS management operations, the PM should be informed to determine whether:
 - Additional resources can be obtained
 - The DMP will need to be re-scoped
- If the DMSMS management operations effort and DMP need to be re-scoped, the DMT also must assess the increased risk assumed by the program office

Planned DMT operations should be based on actual funding allocated to perform DMSMS management operations

Prepare: Establish Interfaces to Advocate for Resilient Designs

3

- DMSMS management practitioners do not design systems; however, DMSMS risk is one consideration that engineers have to balance in designing a system
- The DMSMS management community should:
 - Ensure program office leadership understand the importance of identifying and addressing DMSMS issues early
 - Advocate for the DMSMS considerations during design, with the goal of generating DMSMS resilient designs
 - Identify the risk associated with obsolete or soon-to-be obsolete not designed out of the system
 - Continue to monitor for DMSMS risk

This is a strategic operational process. A design that is DMSMS resilient can delay the occurrence of DMSMS issues and/or increase the likelihood that low cost resolutions are available when DMSMS issues occur.

Prepare: Establish a DMSMS Management Evaluation Process

3

- Program offices should have a process in place to evaluate its DMSMS management operations processes; and continually evaluate their effectiveness against objectives
- The SD-22 describes a recordkeeping framework for the types of data to collect to support such an evaluation
 - Information related to the cost of DMSMS resolutions and DMSMS management operations
 - Information related to the efficiency of DMSMS management operations
- Using the recordkeeping framework can result in:
 - Programming and budgeting benefits
 - Process improvement benefits
 - ROI benefits

This is a strategic operational process. Information collected through the framework for DMSMS recordkeeping can benefit not only the program office collecting the information, but higher-level organizations.

Prepare: Establish a Quality Management System

3

- DMSMS management should function within a Quality Management System (QMS) framework that defines:
 - Organizational structure
 - Responsibilities
 - Methods
 - Data management
 - Processes
 - Resources
 - Customer satisfaction
 - Continuous improvement

Including DMSMS management within a QMS will help achieve optimal benefit and ensure consistency over time

Prepare: Establish a Case Monitoring and Tracking Process

3

- There are two types of cases to track:
 - Known obsolescence
 - Forecasted or anticipated obsolescence
- A case should contain:
 - All relevant item information (e.g., CAGE, part number, NSN, item type, NHA) for the DMSMS issue
 - Resolution options selected and the associated costs and cost avoidance
 - Action tracking information
- Cases should be tracked for all DMSMS issues that are open, closed, and on the watch list

Case management is a valuable method for tracking and managing DMSMS issues from issue identification to implementation of a resolution

Prepare: Establish Supporting Contracts

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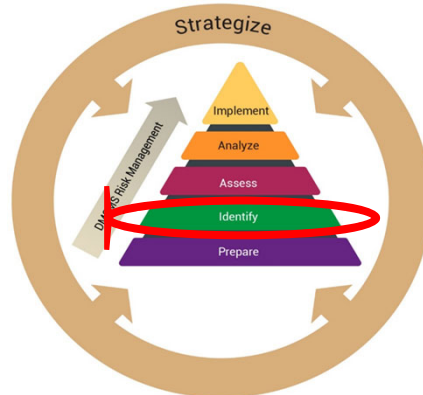
- Program office personnel should be used as efficiently as possible; therefore, it may be desirable to seek DMSMS management services from contractors or independent SME organizations
- The roles and responsibilities of program office and contractors/independent SME organizations may vary depending on the life cycle phase of the system
- Contracts capture the program office's requirements for services, which should include obtaining the technical data necessary to perform DMSMS management operations

If an organization other than the program office will perform DMSMS management activities, a contract or other agreement is needed to establish the program office requirements

Take a break

Lesson 4 – DMSMS Monitoring and Surveillance: Overview

- One-Time Processes
 - Prioritize Systems
 - Identify and Procure Monitoring and Surveillance Tools
 - Collect and Prepare Item Data
- Recurring Processes
 - Analyze Item Availability
 - Assess Preliminary Designs for DMSMS Risk
 - Forecast Future DMSMS Issues



4

The “Identify” phase consists of one-time and recurring processes pertaining to the monitoring and surveillance of DMSMS issues

Prioritize Systems

4

- For a complex platform, prioritization is crucial
- Risk of obsolescence and risk of resultant impact should be assessed
- Criteria for system prioritization include:
 - Safety
 - Mission criticality
 - DMSMS-related costs
 - Existing problems/historically troublesome
 - Life-cycle phase
 - Sustainment strategy
 - Availability of technical data
 - Vulnerability to supply chain exploitations

Each program office should prioritize based on the factors of most importance to its program office and system

Identify and Procure Monitoring and Surveillance Tools

4

- Predictive tools
 - Useful for analyzing items, particularly electronic items
 - Having the results of more than one predictive tool may be desirable
- Other data management tools
 - BOM data management tools
 - Configuration management tools
 - Logistics data collection tools
 - Data storage and retrieval tools
 - Report generation tools

Program offices should identify and procure predictive obsolescence tools and other data management tools to support DMSMS monitoring and surveillance

Collect and Prepare Item Data

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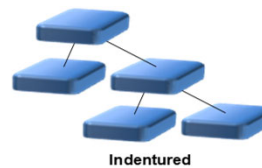
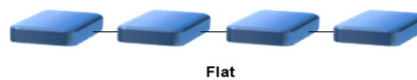
- This one-time, DMSMS management operational process consists of two elements:
 - Item data collection
 - Item data preparation
- Item data is collected and then used to analyze item availability
- The results of this analysis are a list of system items with obsolescence issues

Item Data Collection: Hardware – Electronic and MaSME Items* (1 of 3)

4

BOM Formats and Configurations

- Flat-File Format
 - Simple list of items
- Indentured Format (preferred)
 - Shows relationships (generally top-down) of system to units to assemblies to components



* Material and Structural, Mechanical, and Electrical Items (MaSME)

A BOM is a list of the materials, components, and assemblies needed to produce a unit or system

Item Data Collection: Hardware – Electronic and MaSME Items *(2 of 3)*



- To obtain BOMs:
 - Ensure clear and specific, contractual language for the delivery of BOM data has been included in contracts
 - When a contract does not require the necessary BOMs, a program office should consider the following in making the decision on whether to acquire or build the necessary BOMS –
 - Ensure a business case exists to acquire or build a BOM
 - Acquire a BOM
 - Build a BOM
 - Identify and correct gaps in BOMs
- BOMs for COTS items are:
 - Not usually readily available
 - Not normally required for monitoring purposes
 - Not necessarily cost effective to obtain (but if readily available, should be obtained)

Item Data Collection: Hardware – Electronic and MaSME Items *(3 of 3)*



- In addition to the configuration information conveyed through an indentured BOM, useful item data include:
 - OEM-approved alternatives
 - OEM technical manuals
 - OEM DMSMS mitigation efforts underway
 - Original component manufacturer part number
 - Sources of active manufacturing
 - Actual or projected end-of-life (EOL)
 - Function (active vs. passive, complexity)
 - Type (custom, hybrid, proprietary)
 - Reduction of hazardous substances (RoHS)/lead-free (Pb-free)
 - Fit, form, and function (F3) details

Item Data Collection: Software

4

- Software items are not always captured in a BOM; program offices may need to request that they be included, along with version numbers
- Other sources of software information include:
 - Configuration management documents
 - Software verification document
 - Data rights disclosure letter (if it is a requirement on the contract)
 - Software licensing management group (if one exists)
- It is important for software interdependencies to be captured

Software encompasses COTS, custom, or any combination thereof

Item Data Preparation: Hardware— Electronic and MaSME Items (1 of 4)

4

- For items listed on a BOM, apply a risk-based, prioritization filter to determine the items within the system to monitor, based on the following two determinations:
 - The application of heuristics based on life-cycle estimates to identify the items to definitely monitor
 - Further analysis of uncategorized items for which heuristics did not provide a definitive answer

Item Data Preparation: Hardware— Electronic and MaSME Items (2 of 4)

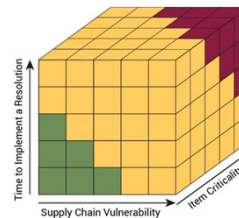
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- **First determination: heuristics, based on life-cycle estimates, to identify the items to definitely monitor**

- This results in three categories:
 - Items to definitely monitor
 - Items not to monitor
 - Items where no further action is required
 - Items where preparations should be taken
- Items for which not enough is known (uncategorized items)

- **Second determination: additional analysis to determine which uncategorized items to proactively monitor**

- Three risk categories to consider:
 - Item criticality
 - Supply chain vulnerability
 - Time to implement a resolution



Item Data Preparation: Hardware – Electronic and MaSME Items (3 of 4)

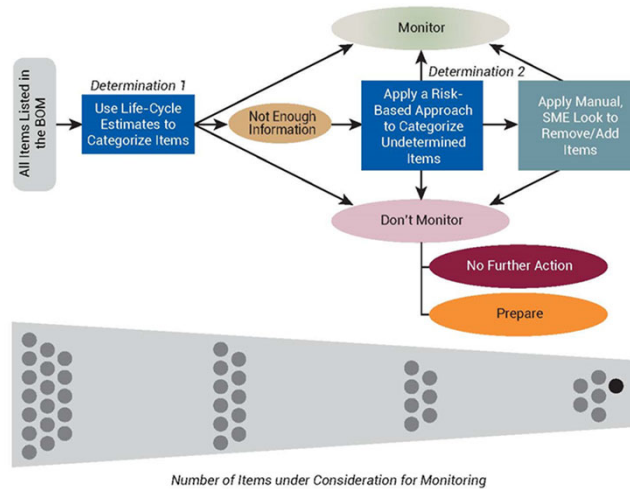
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- A program office should:
 - Tailor the quantitative and qualitative measures and indicators to use for each of the three risk categories
 - Assign weights to these measures and indicators
 - Determine the risk associated with each of the previously uncategorized items
- Regardless of the risk analysis conducted, a subject matter expert should review and adjust the list of do-not-monitor items
- Options for addressing the items for which not enough data exist to determine whether to monitor:
 - Monitor all of these items (low risk/high monitoring cost)
 - Do not monitor any of these items (high risk/low monitoring cost)
 - Conduct further analysis to determine what to monitor (optimizes risk and monitoring cost)

Item Data Preparation: Hardware – Electronic and MaSME Items (4 of 4)

4

Summary Illustration of Risk-Based Approach for Determining Which Items and Materials in the BOM to Monitor



Item Data Preparation: Software

4

- A program office should consult software experts to apply a prioritization to determine where to apply proactive DMSMS monitoring to software items
- Risk-based considerations include:
 - Criticality of impact on system's mission performance
 - Effect on safety
 - Past software problems
 - Information and cybersecurity
 - Complexity of interdependencies with hardware and software
 - Frequency of updates
- Customization is a primary software obsolescence driver
- Once a decision is made on the software items to monitor, a risk-based determination should be made on which versions to track

Analyze Item Availability – Hardware – Electronic and MaSME Items

4

- Accomplished by:
 - Using a predictive tool
 - Manual monitoring through vendor surveys, phone calls, e-mails, and vendor websites
 - Use of critical materials analysis
 - Receipt of product discontinuation notices
- Basic types of availability information:
 - In production
 - In production, but with a discontinuation notice
 - No longer produced by that manufacturer
 - Projected to be out of production in the near term (based on the program's definition)

Items are analyzed for availability to identify the magnitude of a program office's immediate and near-term DMSMS issues

Analyzing Item Availability – Predictive Tools (Parts Databases)

4

- Many items may not be initially recognized by a tool, due to:
 - Typos
 - Transcription errors
 - Bad parts formatting and so forth
- Two tools are better than one, if possible, often due to differing coverage emphasis:
 - Old vs. new items
 - Military focus vs. commercial focus
- Verify and validate tool results prior to taking action:
 - All automated tools are subject to errors
 - There are many examples of false obsolescence alerts

Analyzing Item Availability – Manual, Vendor Surveys

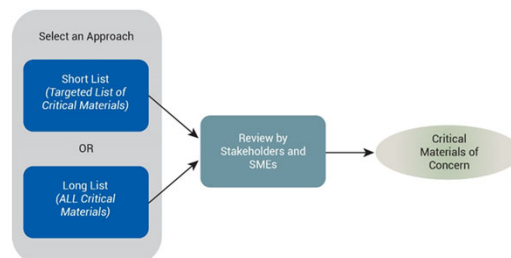
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- Program offices should periodically survey manufacturers about item availability and projected life, through:
 - E-mail communication
 - Phone calls
 - Vendor websites and other web research
- Data captured from market surveys and manufacturers' websites also might include:
 - Sources of active manufacturing
 - Actual or projected EOL
 - Function (active vs. passive, complexity)
 - F3 details; data sheets
 - Warranty information
 - Current software and firmware revisions
 - Information on next-generation products and compatibility
 - Duration of support

Analyzing Item Availability – Critical Materials Analysis

4

- A critical material could be hazardous, exotic, or otherwise supply constrained
- A third risk-based, decision for a program office as part of its foundations for DMSMS management is whether to investigate critical materials in the supply chain



The most cost-effective approach for identifying lower-tier critical materials is to communicate with key critical material stakeholders

Analyzing Item Availability – Product Discontinuation Notice (PDN)

4

- Manufacturers often issue PDNs that alert the end user of obsolescence issues
- Examples of sources:
 - Direct mail/e-mail from the manufacturer
 - Manufacturer’s website
 - Predictive tools often aggregate them for the items they monitor
 - Government-Industry Data Exchange Program (www.gidep.org)
 - Defense Logistics Agency
 - Primes and OEMs often pass them on to programs

Analyzing Item Availability – Special Software Considerations (1 of 3)

4

- Best practice considerations for establishing and maintaining a software obsolescence management approach include:
 - Personnel in charge of research software should have a software background/understanding
 - Periodically review and update software-related, vendor survey questions; include inputs from those who use software-related vendor survey research as part of review
 - Document the research process used and any research agreements or decisions made on what items to research/not research

Different approaches for analyzing software item availability will depend on the type of software in question

Analyzing Item Availability – Special Software Considerations (2 of 3)



- COTS operating system, middleware, and application system
 - Keeping track of licenses and support agreements
 - Analyzing technology and product roadmaps or new release information
 - Participating in user groups
 - Tracking new interface standards
 - Vendor surveys
 - DOD security bulletins for information assurance related to software
- Custom operating system, middleware, and application software
 - Tracking of viable continuation of support (contractual or in-house)
 - Vendor surveys
 - Program office sustainment personnel

Just as qualified sources for hardware items should be identified, so should qualified sources of support for each element of software.

Analyzing Item Availability – Special Software Considerations (3 of 3)



- Open source operating system, middleware, and application software
 - Monitor changes made to open-source version of code (websites are a good source)
- GOTS operating system, middleware, and application software (same as for COTS software)
 - Surveys to be conducted with appropriate government entity
- COTS firmware
 - Monitor item as functional group (i.e., with its related hardware)
 - Include question regarding firmware version or revision in vendor surveys

Assess Preliminary Designs for DMSMS Risk

4

- Assess preliminary designs—new designs and redesigns—for obsolescence risk
 - Impact on cost
 - Impact on schedule
 - Impact on performance
- Conduct assessments in support of design reviews and when new parts lists are received
- Use this obsolescence risk information to inform program office leadership’s decisions that prevent or minimize the obsolete or near-obsolete items in a system’s design

This is a strategic operational process. Early and throughout the system life cycle, program offices should minimize the selection of obsolete parts and/or hazardous or exotic materials in their systems’ designs.

Forecast Future DMSMS Issues (1 of 2)

4

- Strategic plans to address forecasted obsolete items can be implemented:
 - On a item-by-item basis
 - As part of a more comprehensive modification plan
- To develop a picture of when items on a system design will no longer be produced, program offices can use:
 - Some predictive tools that use part introduction date, average life of a technology and other factors to estimate an end of life date
 - Vendor surveys that ask for end of life dates
 - Product roadmaps, market research, and technology roadmaps

This is a strategic operational process. Strategically plan to address forecasted obsolete items before they become a problem.

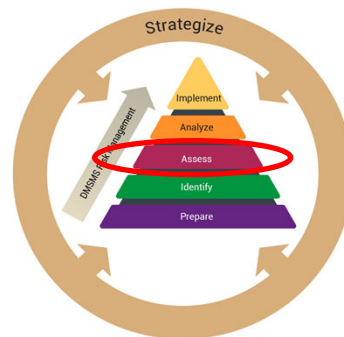
Forecast Future DMSMS Issues (2 of 2)

4

- Developing and maintaining product roadmaps supports both modification planning and DMSMS issue forecasting
- Other types of roadmaps contribute to product roadmaps
 - Product improvement roadmaps
 - Supportability roadmaps
 - Technology roadmaps
- Technology roadmaps enable:
 - Incorporating acquisition and life-cycle sustainment strategies into the product roadmap
 - Minimizing the cost of resolving future obsolescence issues
 - Utilizing state-of-the-art technologies to increase reliability
 - Lowering sustainment costs
 - Increasing warfighting capability to meet evolving requirements throughout an indefinite service life

Lesson 5 – Resolution Need, Timing, and Level: Overview

- Obtain Data Needed for the Assessment
- Determine Whether a Resolution should be Pursued
- Assess Resolution Timing and Level



5

The “Assess” phase examines the potential effects of a DMSMS issue, at any level of a system, on cost, schedule, readiness, and availability

When to Conduct an Assessment

5

- If a program office is proactive, an assessment is initiated as a result of at least one of the following:
 - Predictive tool(s) or vendor surveys indicates an obsolescence problem
 - Receipt of a product discontinuation notice
 - A health assessment reflects a change from the previous health assessment
- If a program is reactive, an assessment is initiated as a result of a failed attempt to procure an item
- Regardless, an assessment seeks to answer three questions:
 - Should a resolution to the problem be pursued?
 - Which problem should be addressed first?
 - At what level should a resolution be applied?

Obtain Data Needed for the Assessment (1 of 2)

5

- Programmatic data
 - Life-cycle phase
 - Planned technology insertions and refreshes
 - Planned end of system life
 - Number of systems in use over time
 - Planned average operating hours per system
- Availability data
 - Needed at the item, assembly, and unit levels (lowest level possible)
 - Differentiate between currently unavailable and forecasted to be obsolete in the near term
 - For software elements, identify and monitor licenses, end-of-support dates, and frequency of updates

Obtain Data Needed for the Assessment (2 of 2)

5

- Criticality data
 - Needed at the item, assembly, and unit levels
 - Both hardware and software items can be determined to be critical based on their functions
 - Cost of the item
- Logistics data
 - Item cost
 - Demand and inventory for the items, assemblies, and units with DMSMS issues
 - Reliability of items, assemblies, and units with DMSMS issues
 - Maintenance philosophy for the items, assemblies, and units with DMSMS issues
 - Repair history
 - Survival rates

Determine Whether a Resolution Should be Pursued

5

- Predictive tool or vendor survey results alone are insufficient rationale to pursue a resolution to a an identified DMSMS issue
- Identified DMSMS issues require validation
- There are conditions under which a resolution might not be pursued:
 - Hardware—electronic and MaSME items
 - There has never been a demand for the item facing a DMSMS issue
 - There is enough inventory to cover demand through the end of need
 - There is an opportunity to obtain items from decommissioned assets or asset recovery as part of upgrades
 - High degree of confidence that all the items needed have been procured
 - Software
 - It is not mission or safety critical
 - It has not changed or no changes are anticipated
 - Underlying layers can be sustained

Should a resolution to the problem be pursued?

Assess Resolution Timing and Level (1 of 3)

5

- Conduct a health assessment
- For hardware items, document over an established timeframe by year:
 - Starting quantity
 - Predicted/actual usage
 - Ending quantity
- For software items, characterize risk by year, as defined by the program office

Item No.	Item Type	Sub System	Status Characteristics	Fy: +1	Fy: +2	Fy: +3	Fy: +4	Fy: +5	Fy: +6	Fy: +7	Fy: +8	Fy: +9	
123	Micro-processor	1	Starting balance	4	3	2	0	-1	-2	-3	-5	-7	
			Predicted/actual usage	1	1	2	1	1	1	2	1	1	1
			Ending balance	3	2	0	-1	-2	-3	-5	-6	-8	-8
456	Amplifier	1	Starting balance	135	122	108	92	75	55	33	8	-18	
			Predicted/actual usage	13	14	16	17	20	22	25	26	26	26
			Ending balance	122	108	92	75	55	33	8	-18	-44	-70
789	Touche screen	2	Starting balance	16	15	14	13	11	10	9	8	7	
			Predicted/actual usage	1	1	1	2	1	1	1	1	2	1
			Ending balance	15	14	13	11	10	9	8	7	5	4
211	Motherboard	2	Starting balance	12	10	7	4	2	-1	-4	-7	-9	
			Predicted/actual usage	2	3	2	3	3	3	2	3	3	3
			Ending balance	10	7	5	1	-1	-4	-7	-9	-12	-15
222	Optics CCA	2	Starting balance	11	11	11	11	10	10	10	10	10	
			Predicted/actual usage	0	0	0	0	1	0	0	0	0	
			Ending balance	11	11	11	11	10	10	10	10	10	
233	Ethernet interface	2	Starting balance	18	14	11	7	3	-1	-5	-9	-13	
			Predicted/actual usage	4	3	4	4	4	4	4	4	4	
			Ending balance	14	11	7	3	-1	-5	-9	-13	-17	
244	Serial I/O CCA	2	Starting balance	2	-8	-83	-128	-173	-218	-263	-308	-353	
			Predicted/actual usage	40	45	45	45	45	45	45	45	45	
			Ending balance	-38	-43	-128	-173	-218	-263	-308	-353	-398	
255	Notebook computer	2	Starting balance	11	10	9	7	6	5	4	2	1	
			Predicted/actual usage	1	1	1	1	1	1	2	1	1	
			Ending balance	10	9	7	6	5	4	2	0	-1	

Health Assessments offer a comprehensive accounting of current and projected hardware and software obsolescence issues

Assess Resolution Timing and Level (2 of 3)

5

- To prioritize hardware items with DMSMS issues, based on impact, consider the following:
 - The number and criticality of items within NHAs
 - Item availability and when an impact is calculated to be experienced by the program office
 - Maintenance philosophy for the items and NHA
 - Programmatic data concerning product improvement plans and other mitigation efforts underway
- Software is somewhat different; some considerations for prioritizing effort include:
 - The number and frequency of updates
 - The number of different versions currently being used on the system
 - The age of the versions in use

Which problem do I work first?

Assess Resolution Timing and Level (3 of 3)

5

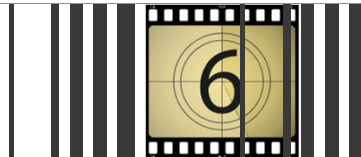
- Evaluate whether a redesign at a higher level would be more cost-effective in the long run by considering:
 - The number and difficulty of DMSMS issues in the hierarchy
 - Reliability of items within the hierarchy
 - Expense of repair within the hierarchy compared to redesign or replacement
 - Life cycle of other items within the hierarchy
 - Potential for enhancing mission capabilities by redesigning or replacing items
- Because software relationships are seldom linear, this question should be determined on a case-by-case basis

Where to Apply the Resolution?

Take a break

Lesson 6 – DMSMS Resolution Determination: Overview

- Identify Resolution Cost Elements
- Identify and Define DMSMS Resolution Options
- Determine the Preferred DMSMS Resolution



The “Analyze” phase explains how to find the best resolution option

Identify Resolution Cost Elements (1 of 2)

6

- Elements to consider in determining the total cost for DMSMS resolutions:
 - Non-recurring engineering
 - Engineering and engineering data revision
 - Purchase engineering, design, or technical data
 - Qualification of new items
 - Revision of test procedures
 - Software changes
 - Start-up costs
 - Testing
 - Tooling, equipment, test equipment, and software
 - Computer programs and documentation
 - Interim support
 - Item cost
 - Manpower
 - Spares
 - Supply and provisioning data
 - Support and test equipment
 - Technical manuals
 - Training and trainers
 - Other

To evaluate potential resolutions, the total implementation cost (sum of all applicable cost elements) for each resolution should be understood

Identify Resolution Cost Elements (2 of 2)

6

- Counterfeit items and the use of lead-free solder in electronic items are prevalent and impact the costs and risks to resolve DMSMS issues
- Additional testing is necessary to ensure that counterfeit parts don't enter the DOD supply chain, if a DMSMS resolution involves the purchase of an electronic from any source other than authorized suppliers

The cost of this additional training should be included in the total resolution cost

Identify and Define DMSMS Resolution Options

6

- The 12 basic resolutions options for resolving a DMSMS issue fall into three broad categories:
 - Existing material (logistics). Require actions to secure the availability of existing supply
 - Substitutes (engineering). Require engineering involvement to qualify or implement
 - Redesign (engineering). Require all aspects of engineering/qualification to implement new or highly modified equipment

Resolution Options

6

TYPE	RESOLUTION
	No Solution Required
Existing Material (Logistics)	Approved Item
Existing Material (Logistics)	Life of Need Buy
Existing Material (Logistics)	Repair, Refurbishment, Reclamation
Existing Material (Logistics)	Extension of Production or Support
Substitute (Engineering)	Simple Substitute
Substitute (Engineering)	Complex Substitute
Substitute (Engineering)	Development of a New Source
Redesign (Engineering)	Design Refreshment
Redesign (Engineering)	Redevelop the Item
Redesign (Engineering)	Redesign—NHA
Redesign (Engineering)	Redesign—Complex/System Replacement

Determine the Preferred DMSMS Resolution

(1 of 2)

6

- Before proceeding to the determination of the preferred resolution, determine:
 - Whether the issue will be resolved by an external organization
 - If the assessment indicated the potential for a higher-level resolution
- Determine the preferred resolution by:
 - Determining viable resolution options and costs at the item or higher-level, as appropriate
 - Conducting a business case analysis/analysis of alternatives
 - Presenting the results to the program manager
 - Making a decision on the preferred resolution

Determine the Preferred DMSMS Resolution

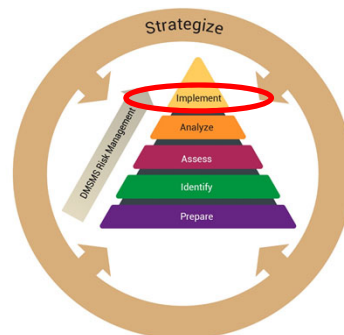
(2 of 2)

6

- The role of design considerations that also impact the feasibility of resolutions, e.g.,
 - Real-time software
 - Validation and production testing
- The role of roadmaps
 - Direct impact on formulating resolutions
 - Interfaces with modification planning in formulating resolutions

Lesson – DMSMS Resolution: Overview

- Program and Budget for DMSMS Resolutions
- Integrate DMSMS Resolution and Modification Funding
- Implement DMSMS Resolutions



7

The “Implement” phase describes how to approach securing resolution funding and implementation of a chosen DMSMS resolution

DMT Roles and Responsibilities for Implementation



- The DMT should be involved in three final processes:
 - Programming and budgeting for the implementation of preferred resolutions
 - Integrating DMSMS resolution and modification funding
 - Overseeing the implementation of DMSMS resolutions
- Per some contracts, the contractor may be required to fund DMSMS resolutions, a situation that is complex:
 - If the contract requires the contractor **to buy additional items to resolve a DMSMS issue and the definition of “end of life” differs between that of the program office and the contractor**
 - If the contract requires the contractor **to resolve DMSMS issues**

A DMT’s responsibilities do not end with a decision from a PM to pursue a resolution option

Program and Budget for DMSMS Resolutions



- Programming and budgeting should cover the implementation of resolutions for known and forecasted DMSMS issues
- The DMT can assist in developing the program office leadership’s programming and budgeting submissions for implementing DMSMS resolutions
- Programming and budgeting for DMSMS resolution funding is only needed for those resolutions implemented solely or largely to resolve DMSMS issues

The best way to secure DMSMS resolution funding is to program and budget in advance (but there are no guarantees!)

Integrate DMSMS Resolution and Modification Funding



- Programming and budgeting for modifications is typically the responsibility of modification planners
- Modification programming and budgeting best practices include:
 - Consider approved modification POMs and budgets when calculating the size of LON buys
 - Consider funded modification plans when formulating DMSMS resolution-specific POMs and budgets to avoid duplication
 - Consider adjusting modification efforts to initiate DMSMS resolutions to avoid an immediate impact on the system when emergency and unpredicted, execution year obsolescence occurs

Modifications provide opportunities to resolve DMSMS issues

Implement DMSMS Resolutions



- The program office should follow its standard process for updating configurations and engineering modifications:
 - Some changes may be largely clerical and not require a specified process for updates
 - Other changes will require a formal change process
- The DMT should remain involved during implementation:
 - Ensure that all stakeholders understand their roles and responsibilities for implementation
 - Ensure that the implementation steps are defined
 - Verify that appropriate technical actions were successfully carried out
 - Monitor the process
 - Obtain feedback on the project status
 - Update BOMs being monitored
- A program office champion can be critical to implementation success
- In some cases, the DMT is asked for advice on procedures to deal with issues that arise during implementation

The job is not complete until the resolution is fully implemented

QUESTIONS?

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14. ABSTRACT A DMSMS Management Plan (DMP) documents the foundations of a DMSMS management approach established by program office leadership and identifies the risks associated with deviations from the standard DMSMS management processes described in this document. As such, the DMP establishes a robust DMSMS management framework for a program office. Without an adequate plan, a program office cannot have effective DMSMS management. Developing a DMP requires detailed consideration of how DMSMS management principles should be integrated within the program office's mission. The DMP also describes the DMSMS management team and its duties within a set of tailored DMSMS management processes ideally designed to avoid miscommunication. The tailoring is a function of each program office's specific infrastructure, record keeping procedures, quality management plans, resources, priorities, and constraints (e.g., the number of people, the amount of funding, access to bills of material/parts lists and associated technical data, and the ability to conduct vendor surveys on item availability). This presentation is training on the development of a DMP.					
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