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Strategic Diminishing Manufacturing Sources and Material Shortages (DMSMS) Management and Product Roadmaps

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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.

Strategic Diminishing Manufacturing Sources and Material Shortages (DMSMS) Management and Product Roadmaps

Presented to the
Parts and Material Management Annual Conference
March 7 – 10, 2022

IDA

Jay Mandelbaum
Christina M. Patterson
Institute for Defense Analyses

Outline

- **Roadmaps and how they are built**
- **Best practices on how the DMSMS community should**
  - **Use product roadmaps**
  - **Contributes to product roadmaps and modification planning**
- **Continuous improvement**

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Product Roadmaps

- Definition: the evolution of the product (or system) resulting from an acquisition program; it includes all funded as well as planned but not yet funded modifications
- Product changes caused by
  - Inability to support
  - Changes to the threats
  - Safety deficiencies
  - New security requirements
  - New statutory or regulatory requirements
  - Insufficient reliability or maintainability
  - Changes to technology
- Reflected in the integrated master schedule, program manager responsibility

Sum of product improvement & supportability changes

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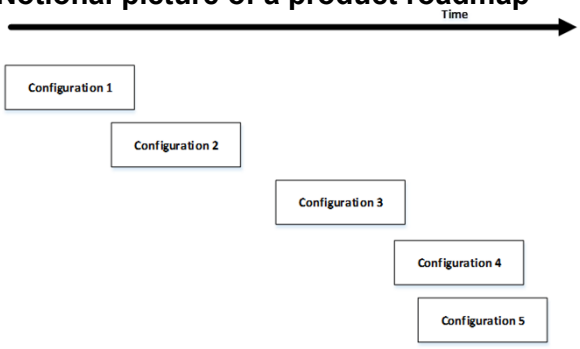
Product Roadmaps cont'd

- Notional picture of a product roadmap



- Configuration changes result from modifications
- All configuration changes may not be represented in a single product roadmap
- Roadmaps vary by level of detail, format, and coverage

Source: Adapted from Irene J. Petrick, *Developing and Implementing Roadmaps – A Reference Guide*, The Pennsylvania State University, nd.

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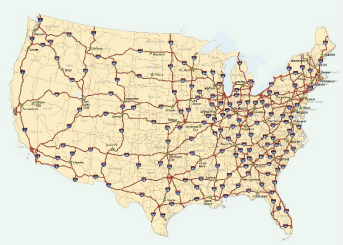
Types of Roadmaps that Support the Product Roadmap



- Supportability roadmaps
- Product improvement roadmaps
- Technology roadmaps

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Supportability Roadmaps

- Portray improvements in ability to maintain or sustain, reliability increases, service life extensions
- Driven by
  - DMSMS issues (most commonly)
  - Funded plans to reduce total ownership cost

- Vary by level of detail, format, and coverage
- Will not be a single roadmap, joint Product Support Manager (PSM) and integrated process team (IPT)-level responsibility

The DMSMS community must be funded to develop the basis of these roadmaps

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Product Improvement Roadmaps

- Portray capability improvements, safety enhancements, information assurance, and other new requirements
- Reflect funded plans for when improvements will be in place
- Align with technology insertion
- Vary by level of detail, format, and coverage like product roadmaps
- Will not be a single roadmap, IPT-level responsibility

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Technology Roadmaps

- Capture the technology changes enabling product improvement or supportability enhancement
- Based on technology management
  - Market research
  - Basic and applied R&D
- Vary by level of detail, format, and coverage
- Will not be a single roadmap
- Typically PSM responsible for supportability and IPT-level responsible for product improvement
  - Frequently constructed outside of the program office and must be separately funded

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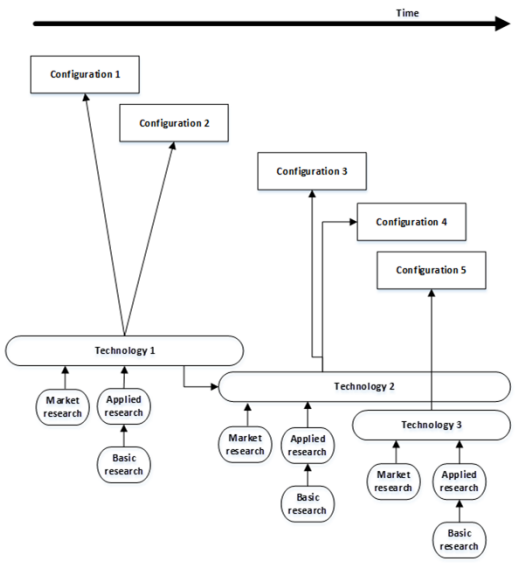
Technology Roadmaps cont'd

- Notional technology roadmap interactions with a product roadmap



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Outline

- Roadmaps and how they are built
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  - Use product roadmaps
  - Contributes to product roadmaps and modification planning
- Continuous improvement

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Forecasting Future DMSMS Issues

- DMSMS health assessments provide the estimated time when parts in an assembly may no longer be available; they utilize
  - Expected demand
  - Expected end of life obtained from predictive tools, vendor surveys, and other research
    - Possibly modified by technology roadmaps when they are available
  - System configuration changes reflected in product roadmaps

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Formulating DMSMS Resolutions Possibly in Advance of Actual Obsolescence

- Sizing life-of-need buys
  - Product roadmap defines the length of need
- Formulating resolutions based on planned configuration changes
  - Evaluating competing resolutions
    - Choosing between a life-of-need buy and a substitute
  - Planning a multi-phase resolution
    - Determining what to do until a funded modification removes the obsolete item from the system
    - Combining the DMSMS resolution with the modification scope of work if the obsolete item was not planned to be replaced
      - May cost less than doing each independently
      - May enable a more optimal resolution at a higher level of assembly

And ultimately, making it easier to justify resolution funding

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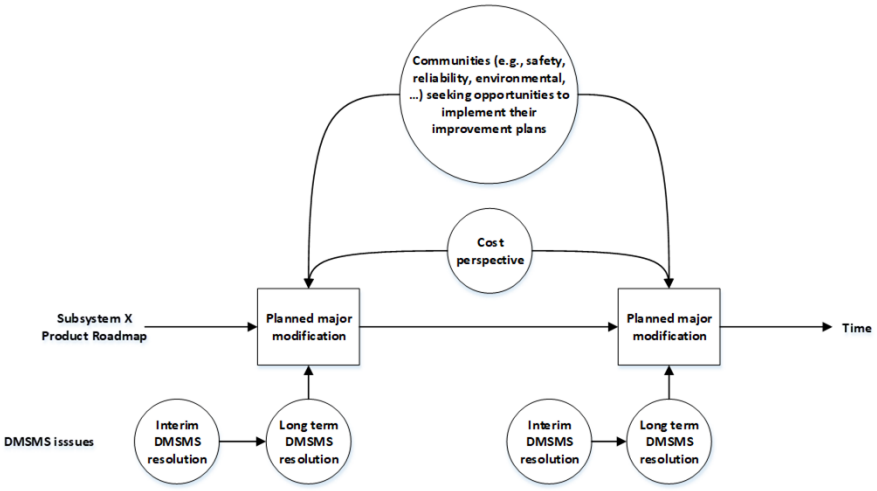
Formulating DMSMS Resolutions cont'd



Modifications change product configurations

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Outline

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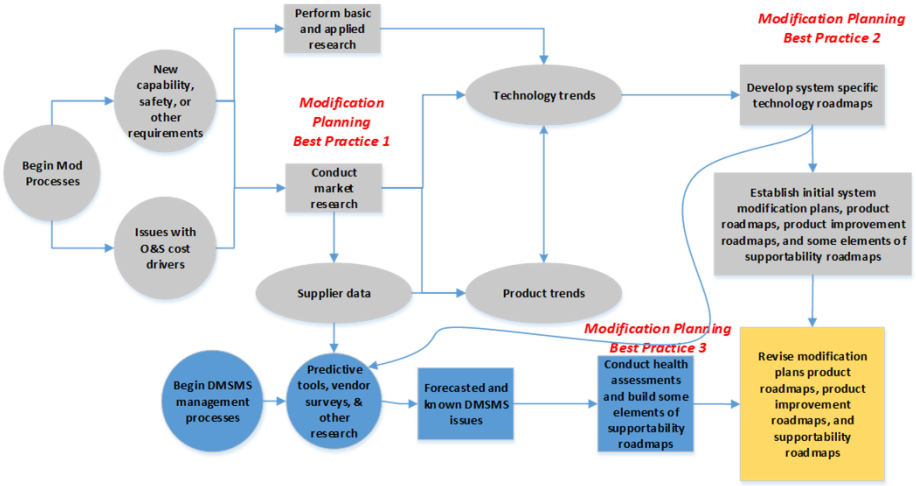
Interactions Among DMSMS Management, Roadmapping, and Modification Planning



The best practices apply to both DMSMS management and modification planning

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Utilize Market Research to Minimize Near-Term DMSMS Issues

- Identify areas where new technologies will be introduced
- Drive technology roadmap changes
- Improve forecasts of future DMSMS issues based only on predictive tools and vendor surveys

Strong consideration should be given to the incorporation of market research findings into modification plans

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Utilize Technology Roadmaps to Guide Modification Planning

- Select technology roadmap areas based on system needs
- Inform product improvement and supportability enhancement plans
- Inform DMSMS issue forecasts

Modification plans developed without technology roadmaps may be more costly and lead to suboptimal system changes

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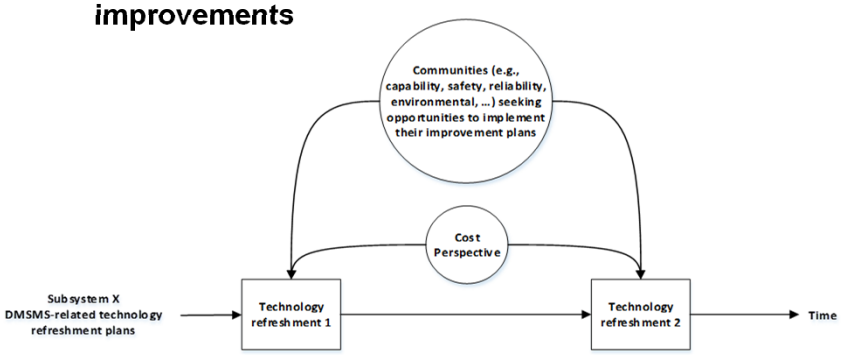
Use DMSMS Health Assessments to Refine Modification Plans

- Slide 12 discussed refining the scope of work of existing modification plans based on multi-phase DMSMS resolutions
- DMSMS necessitated technology refreshment provides opportunity to incorporate new capability improvements



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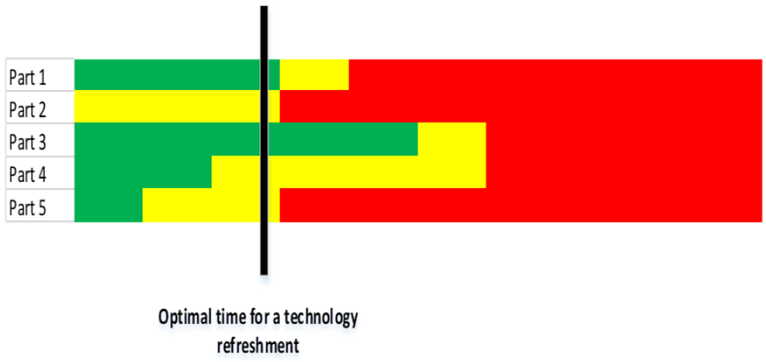
Use DMSMS Health Assessments to Refine Modification Plans cont'd

- DMSMS resolutions may impact modification plan timing if no acceptable multi-phase resolution is possible



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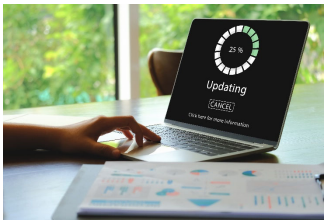
Repeating the Process



- Product roadmaps may change for reasons other than DMSMS issues
  - Funding disruptions
  - Technological breakthroughs
  - Urgent new requirements
- DMSMS forecasts may change for reasons other than roadmap changes
  - Unanticipated obsolescence with limited resolution options
    - Regulatory causes
    - Market causes
  - Faulty life-of-need buy assumptions

Roadmaps and modification and DMSMS resolution plans must be routinely updated and coordinated

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Questions

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14. ABSTRACT

For effective DMSMS management, the DMSMS community should maintain awareness of up-to-date product improvement roadmaps developed to add or enhance system capability. The DMSMS community can use this information to determine:

- The length of time an obsolete item will be needed on the system,
- Recommendations for resolutions for that item, and
- Resources to include in programming and budgeting requests for DMSMS resolutions.

Subsystem IPTs are responsible for developing and implementing product improvement roadmaps. Product improvement roadmaps may include some supportability elements associated with the product improvement efforts, but this is not all of the supportability roadmapping needs. Therefore, of equal importance as part of strategic DMSMS management, the DMSMS community should generate information and analysis about DMSMS issues that will impact the supportability of the product unless a resolution is identified and implemented that the PSM and/or subsystem IPTs can use and analyze to establish actual product supportability roadmaps for closing those gaps.

But that's not the end. Things change. The DMSMS community must remain vigilant and continuously update its assessments regarding when a product will no longer be supportable and propose resolutions to extend the supportability of the product throughout the life cycle of the system.

15. SUBJECT TERMS

DMSMS, obsolescence, roadmap, product roadmap, technology roadmap, supportability roadmap

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