IDA

INSTITUTE FOR DEFENSE ANALYSES

Obsolescence Management for Structural, Mechanical, and Electrical Items in Conjunction with Electronics

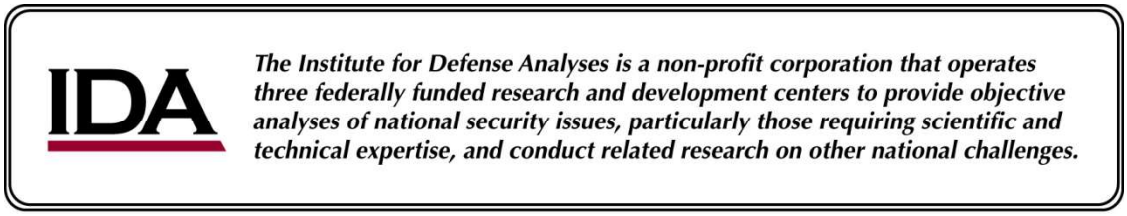
Jay Mandelbaum

Christina M. Patterson

April 2015

IDA Document NS D-5483
Log H 15-000412

INSTITUTE FOR DEFENSE ANALYSES
4850 Mark Center Drive
Alexandria, Virginia 22311-1882



About This Publication

This work was conducted by the Institute for Defense Analyses (IDA) under contract HQ0034-14-D-0001, Task DE-6-3405, "Fostering Proactive Diminishing Manufacturing Sources and Material Shortages (DMSMS) and Parts Management," for the Office of the Defense Standardization Program Office through the Defense Logistics Agency. The views, opinions, and findings should not be construed as representing the official position of either the Department of Defense or the sponsoring organization.

Acknowledgments

The authors would like to thank Dr. Robert J. Atwell for reviewing this document.

INSTITUTE FOR DEFENSE ANALYSES

IDA NS D-5483

Obsolescence Management for Structural, Mechanical, and Electrical Items in Conjunction with Electronics

Jay Mandelbaum

Christina M. Patterson

Obsolescence Management for Structural, Mechanical, and Electrical Items in Conjunction with Electronics

International Institute of Obsolescence Management Conference
Edinburgh, Scotland
June 16-18, 2015

IDA

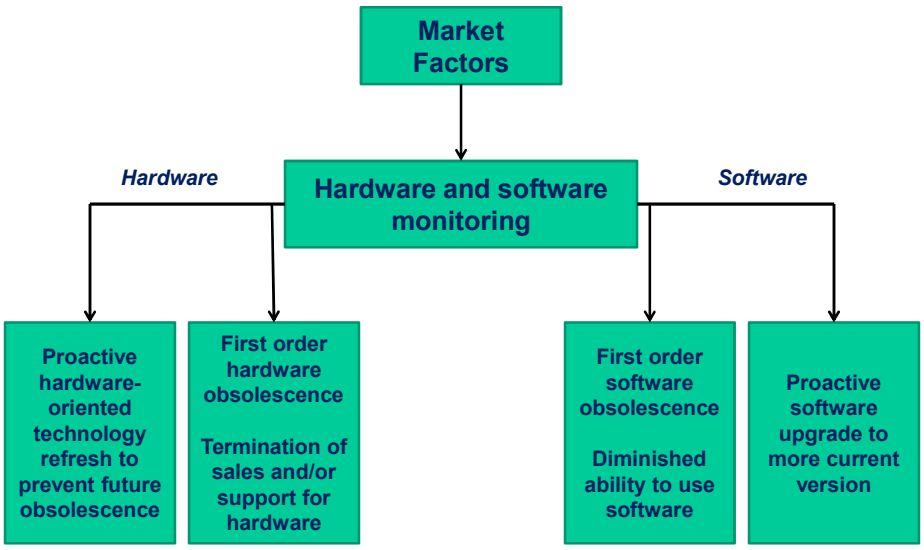
Jay Mandelbaum
Christina Patterson

Overview

- **Scope**
  - **Materials and mechanical items that are identified in a Bill of Materials (BOM), e.g.,—**
    - **Adhesives**
    - **Insulating Material**
    - **A Diesel Engine**
    - **A Fender**
- **This presentation will address—**
  - **Obsolescence mechanisms**
  - **Questions and decisions facing a program in determining—**
    - **To what extent to apply obsolescence management**
    - **When to start**
  - **A risk-based framework**

2

Obsolescence Mechanisms (1 of 2)



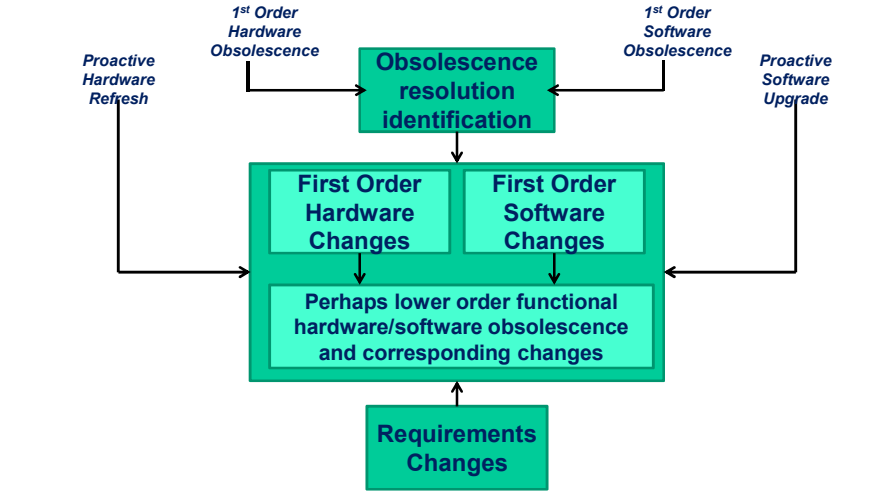
3

First Order Hardware Obsolescence Mechanisms for Materials and Mechanical Items

- Use of hazardous materials
  - May become unavailable or hard to get (e.g., Freon)
- The supplier goes out of business
  - Not financially viable
- The supplier's business case is no longer viable
  - Tungsten rhenium wire or some exotic material
- Use of supply-constrained materials
  - Supply limited by regulation or supplier policy
- The tooling is no longer available

4

Obsolescence Mechanisms (2 of 2)

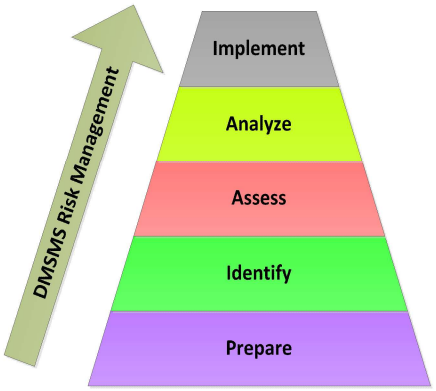


Materials and mechanical items obsolescence mechanisms are similar to electronic items, but product life-cycle time is longer

5

Obsolescence Management Overview

- *Prepare:* Establishment of a obsolescence management program infrastructure
- *Identify:* Obsolescence monitoring and surveillance
- *Assess:* Obsolescence impact assessment
- *Analyze:* Resolution determination
- *Implement:* Implementation of obsolescence resolutions



6

Prepare: Establishing Strategic Underpinnings

- Two questions to be answered by program management
  - To what extent should a program apply obsolescence management to materials (including critical materials* in the supply chain) and mechanical items?
  - When should a program's efforts begin in these areas?

* Critical materials include hazardous, exotic, and supply-constrained materials

Responses to these questions assume that resources are constrained and a risk-based approach should be pursued

7

Prepare: Prioritizing Obsolescence Effort as Part of Establishing Strategic Underpinnings (1 of 3)

- Two elements of prioritization
  - Prioritize the systems/sub-systems of interest
    - No changes to strategic underpinnings when mechanical items and materials are considered
  - Determine the items (including critical materials in the supply chain) in the sub-systems of interest to be monitored
    - This is where strategic underpinnings for monitoring materials and mechanical items (and electronic items too) should be explicitly considered

Three determinations should be made when establishing strategic underpinnings; two of which apply to materials and mechanical items identified in a BOM

8

Prepare: Prioritizing Obsolescence Effort as Part of Establishing Strategic Underpinnings (2 of 3)

- Determine the items (including critical materials in the supply chain) in the sub-systems of interest to be monitored
  - Items that are listed in a BOM
    1. Determine the heuristic algorithms to use to identify the families of materials and mechanical items (and electronics too) to definitely monitor
    2. Determine whether to further analyze uncategorized items
  - Critical materials that appear in lower level tiers of the items listed on the system's BOM
    3. Determine whether to investigate critical materials in the supply chain

Ultimately, program management must decide whether or not resources should be applied to obsolescence management to reduce rick to an acceptable level

9

Prepare: Prioritizing Obsolescence Effort as Part of Establishing Strategic Underpinnings (3 of 3)

- Determine when obsolescence management effort for materials and mechanical items (including critical materials in the supply chain) should begin
  - Early monitoring provides—
    - A larger window of opportunity to do something about an issue
    - The availability of a larger selection of less expensive resolutions
    - A smaller likelihood of schedule or readiness impacts
  - Only high risk materials and mechanical items are monitored; if the risk is high, proactive monitoring should begin early in the life cycle
  - Material and mechanical item monitoring is integrated with electronics item monitoring
  - Designs containing high risk materials or mechanical items can be revised before it is much more costly to make changes later

BEST PRACTICE:
Begin proactive obsolescence management for materials and mechanical items at the same time as for electronic items

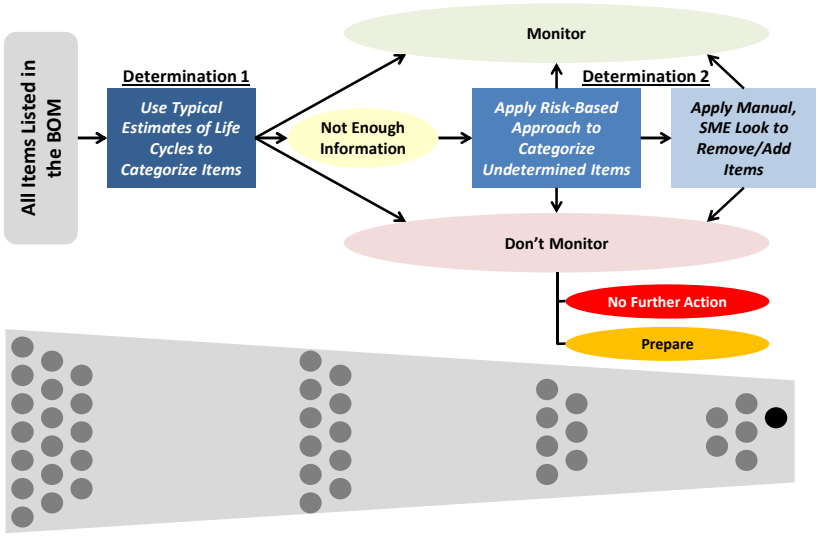
10

Identify: Two Different Approaches

- **Materials and mechanical items (and electronics items too) that are listed in a BOM**
  - **Applies to the first two determinations from the strategic underpinnings on what to monitor**
    1. **Apply the heuristic algorithms to identify the items to definitely monitor**
    2. **Further analyze (as appropriate) uncategorized items where the heuristics did not provide a definitive answer**
       - **There are other potential benefits for the program**
- **Critical materials that appear in lower level tiers of the system**
  - **Applies to the third determination from the strategic underpinnings on what to monitor**
    3. **Investigate how critical materials in the supply chain or in a manufacturing process may alter the status of items being proactively monitored**

11

Identify: Item Data Preparation Overview



12

Identify: Framework for a Risk-Based Approach— *Determination 1* (1 of 2)

- Apply heuristic algorithms to categorize the items as—
  - *Definitely monitor:* Item types with a high propensity for obsolescence issues, e.g.,—
    - Electronic COTS assemblies (e.g., networking gear, computers, active components, radiofrequency components, programmables, memory, microprocessors, ASICs, hybrids, and custom electronic assemblies
    - Sole-source items that are in low demand
    - Custom passive items
    - Materials with chemical properties that are a function of the design, are sole source, or otherwise threaten the environment
    - Electro-mechanical items
  - *Don't Monitor:* Item types that are standard industrial items, e.g.,—
    - Mechanical components
    - Connectors
    - Cabling
    - Consumables
  - *Not enough information to determine whether to monitor*

Results in an initial categorization of items listed in the BOM

13

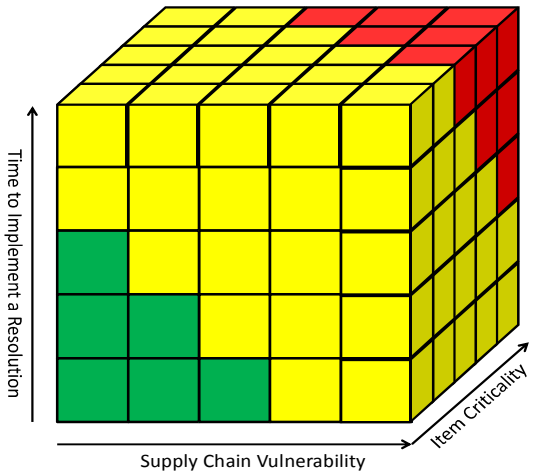
Identify: Framework for a Risk-Based Approach— *Determination 1* (2 of 2)

- Options for deciding what to do about the uncategorized items from Determination 1
  - Monitor ALL uncategorized items (Low risk, High monitoring cost)
  - Conduct further analysis of uncategorized items to determine what to monitor; Commence Determination 2
  - Do not monitor any uncategorized items (High risk, Low monitoring cost)

BEST PRACTICE:
The middle option—Optimizes risk and monitoring cost, but there are start-up expenses

14

Identify: Framework for a Risk-Based Approach— *Determination 2* (1 of 3)



Where is proactive monitoring of uncategorized items important?

15

Identify: Framework for a Risk-Based Approach—*Determination 2* (2 of 3)

Item Criticality	Supply Chain Vulnerability	Time to Implement Resolution
• Critical safety item • Mission criticality • Item essentiality code • High demand (perhaps 10%) • High cost	• Source related • Financial health of supplier • Persistent backorders (over period of time) • Long customer wait-time (perhaps top 10%) • Recent significant price increase • Time since last order (perhaps if more than 3 years) • Low demand • Life cycle of the item	• TDP availability for mechanical item or availability of material specification for engineered material • Source controlled • Manufacturing difficulty • Long lead time to requalify • Manufacturing cycle time • Availability of tooling and test equipment • Cost to implement resolution • Defense unique

Apply the risk cube to determine those previously uncategorized items that are high risk; this is where the principal start-up expenses would be incurred

16

Identify: Framework for a Risk-Based Approach— *Determination 2* (3 of 3)

- Manually adjust the "Monitor" and "Don't Monitor" lists, based on—
  - An assessment of considerations that are not available from an automated database
  - Any known vulnerabilities, such as items on the platform:
    - That members of the DMT know to be a problem
    - Where there are pending environmental or safety regulations that may limit their availability and use in any area of the world where the system operates

Could apply whether or not the risk cube is conducted

17

Identify: Analysis of Item Availability

- Most predictive tools do not cover materials and mechanical items; product discontinuation notices are also not usually issued in these cases
- Therefore, for materials and mechanical items on the "Definitely Monitor" list—
  - Conduct research and/or vendor surveys to identify any issues
  - No need to modify content of vendor surveys in use today
  - Determine the appropriate frequency of vendor surveys for materials and mechanical items, based on a function of obsolescence risk, resources, and criticality/safety

18

Assess

- **Should a resolution to the problem be pursued?**
  - **Compare days of supply with expected time to implement a resolution**
    - **If item is obsolete, comparison will identify whether resolution can be deferred or not**
    - **If the item is not obsolete and the time for a resolution is long, as appropriate, increase the on-hand inventory (and maintain at a higher level) or take action to reduce the time to realize a resolution**
- **Which problem should be addressed first?**
  - **To include consideration as to whether a problem is a common issue that will be addressed by an external organization**
- **At what level should a resolution be applied?**

19

Analyze

- **For issues being addressed by an external organization, the program only needs to monitor that the resolution remains on track**
- **The same resolution types apply**
  - **No solution required**
  - **Approved part**
  - **Life of need buy**
  - **Repair, refurbishment, or reclamation**
  - **Extension of production or support**
  - **Simple substitute**
  - **Complex substitute**
  - **Development of a new item or source**
  - **Redesign – NHA**
  - **Redesign – complex/system replacement**

There may be a different distribution of resolution types

20

Questions?

21

REPORT DOCUMENTATION PAGE	Form Approved OMB No. 0704-0188

1. REPORT DATE (DD-MM-YY)	2. REPORT TYPE	3. DATES COVERED (From – To)
xx-4-2015	Final	

4. TITLE AND SUBTITLE

Obsolescence Management for Structural, Mechanical, and Electrical Items in Conjunction with Electronics

5a. CONTRACT NO.

HQ0034-14-D-0001

5b. GRANT NO.

5c. PROGRAM ELEMENT NO(S).

6. AUTHOR(S)

Jay Mandelbaum, Christina M. Patterson

5d. PROJECT NO.

5e. TASK NO.

DE-6-3405

5f. WORK UNIT NO.

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Institute for Defense Analyses
4850 Mark Center Drive
Alexandria, VA 22311-1882

8. PERFORMING ORGANIZATION REPORT NO.

IDA Document NS D-5483
H 15-000412

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

Defense Standardization Program Office
Defense Logistics Agency
8725 John J. Kingman Road
Fort Belvoir, VA 22060

10. SPONSOR'S / MONITOR'S ACRONYM(S)

DSPO

11. SPONSOR'S / MONITOR'S REPORT NO(S).

12. DISTRIBUTION / AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

Department of Defense programs have traditionally focused their obsolescence management efforts on electronic items. This presentation will: (1) discuss how obsolescence mechanisms apply to non-electronic items; (2) describe the types of questions and decisions that a program will face in determining when to start and to what extent to apply obsolescence management to non-electronic items in a budget constrained environment; and (3) present a framework for a risk-based approach for identifying which items are of most potential concern.

15. SUBJECT TERMS

DMSMS, obsolescence

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NO. OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Donna McMurray
U	U	U	UU	11	19b. TELEPHONE NUMBER (Include Area Code) 703-767-6874