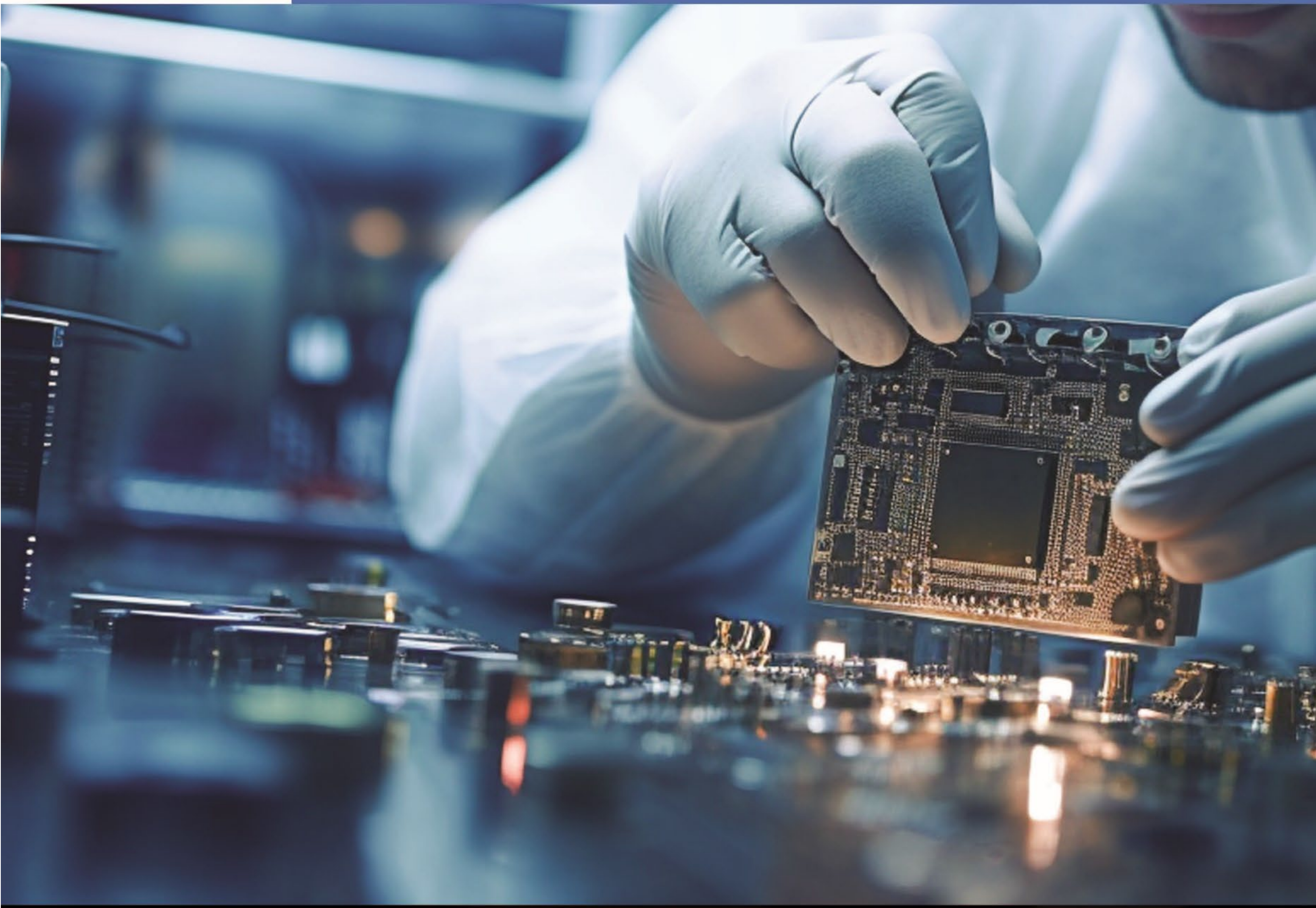
SD-19

Parts Management Guide

A Guidebook of Best Practices for Oversight of Part Selection in Defense Systems



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Foreword

The Department of Defense (DoD) Adaptive Acquisition Framework (AAF) establishes a set of acquisition pathways that are designed to allow for tailored strategies that support the delivery of better solutions and capabilities faster. The AAF approach emphasizes transparency, speed of delivery, continuous adaptation, and frequent modular upgrades. This change in how the DoD approaches system development requires program managers, system engineers, product support managers, and contractors to design tailorable parts management approaches, including engineering design considerations, that align with the specific acquisition pathway selected. Engineering design considerations include traditional design, system security engineering, and supply chain risk management.

This publication is intended to be used by government acquisition activities and defense contractors. The document provides government and industry managers guidance to support achieving a more disciplined and integrated parts management approach. The parts management approach ensures that acquisition activities and defense contractors meet system requirements and balance the costs and risk of selection considerations for DoD programs.

This version of the SD-19 document updates the December 2013 version, and it introduces a new parts management paradigm and vision that are achieved by increasing the level of discipline applied in program office part selection oversight by emphasizing and applying best practices found in MIL-STD-11991—General Standard for Parts, Materials, and Processes—and the SD-26—DMSMS and Parts Management Contracting Guide. The new paradigm also relies on collecting and analyzing records on parts selection oversight activities and their effects on cost, schedule, and performance; and, obtaining part selection data and using tools to analyze the data in support of best practices.

Recommended changes to this publication should be sent to the Defense Standardization Program Office, 8725 John J. Kingman Road, Stop 5100, Fort Belvoir, VA 22060-6220, or via email to DSPO@dla.mil.

MICHAEL A. HEAPHY JR.
Director, Defense Standardization Program Office

Section 1. Introduction

1.1 Definitions and Responsibilities

1.1.1 What is parts management?

Parts management is a systems engineering discipline for *selecting* parts and assemblies of parts, while accounting for the materials and processes used to manufacture them, throughout all phases of a system's (or equipment's) life cycle from initial design through disposal.

> ***A "part"*** *is any single unassembled hardware element of a major or minor component, accessory, or attachment that is not normally subject to disassembly without the destruction or impairment of its design use. Examples include but are not limited to elements inside custom devices, resistors, integrated circuits, and connectors.*[1]
>
> *The source of this definition defines subcategories as follows.*
>
> - *Electrical, electronic, and electromechanical parts carry, store, or transmit electrical current, and/or electromagnetic or optical waves in the intended application.*
> - *Mechanical parts have a single, non-electrical function (other than electrical grounding) and contain one or more necessary material items.*
>
> ***A "material"*** *is a metallic or nonmetallic element, alloy, mixture, or compound used in a manufacturing operation that becomes a permanent portion of the manufactured item, or which can leave a remnant, residue, coating, or other substance that becomes or affects a permanent portion of a manufactured item. Environmental materials (moisture, oxygen in the air, etc.) such as those used in tooling or equipment not intended to modify or leave residues are not meant to be covered by this definition.*[2]
>
> ***A "process"*** *when used in the definition of parts management is an operation, treatment, or procedure used during fabrication of materials, parts, subassemblies, and/or assemblies that modifies an existing configuration, creates a new configuration that alters the form/fit/function, and/or changes the chemical, physical, and/or the mechanical properties of the parent item.*[3]

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[1] Military Standard (MIL-STD)-11991B, *General Standard for Parts, Materials, and Processes*, October 3, 2023.

[2] Ibid.

[3] Ibid.

Part Selection Considerations

Part selection decisions should result in achieving application requirements throughout a system's life cycle. During design, part selection decisions are based on the thoughtful assessment and balancing of numerous, overlapping engineering design considerations (many of which are not the responsibility of the parts management practitioner, whether in government or industry).

Part selection considerations include performance, cost, quality, qualification, reliability, maintainability, supportability, standardization, technology features and life-cycle stage, manufacturing processes and producibility, Diminishing Manufacturing Sources and Material Shortages (DMSMS) risk, system security, cyber weaknesses and vulnerabilities, hardware and software assurance, supply chain risk, susceptibility to counterfeiting, unauthorized tampering, and use of hazardous materials.[a]

The selection decision also varies as a function of criticality,[b] the application of the part within the design, program duration, risk that the program office is willing to accept, and other factors.

[a] Performance and cost are included as design consideration even though they are often optimized based on constraints from the other design considerations. If the optimized values are unacceptable, then trades will be made.

[b] This document uses the term critical to encompass either mission essential or safety critical parts. A mission essential part is an item whose failure implies that the mission likely will not be completed. A safety critical part is an item that if missing or not conforming to the design data, quality requirements, or overhaul and maintenance documentation, would result in an unsafe condition. The part itself is not inherently critical. Instead, it's the use of the part in the design. The program office, with input from the contractor, determines criticality.

Parts selection is associated with all initial designs, redesigns, engineering changes, configuration changes, part replacements, and parts used to maintain a system during sustainment. Parts management should not be confused with the materiel management logistics function defined as "the phase of military logistics that includes managing, cataloging, demand and supply planning, requirements determinations, procurement, distribution, overhaul, and disposal of materiel."[4]

1.1.2 Government and Contractor Parts Management Roles

Contractors select the majority of parts for most Department of Defense (DoD) systems, especially during design or redesign. The government program office's role in parts management is primarily contractor oversight, which may encompass parts approval.

As indicated in the above definition of parts management, many considerations affect a decision to choose or approve the use of a part for a DoD system. All those considerations can be integrated into a single question, "Does the part meet all of its allocated and derived requirements?" Answering this question is a key role of the part selection practitioner whether actually choosing the part or overseeing the part selection process and its results.

The question is answered through the system engineering process' decomposition of system-level requirements down to the subsystem, assembly, and part level. This requirement decomposition process is not limited to performance or physical requirements. Every consideration should represent a derivable requirement although some requirements associated with the supply chain or system security are not always decomposed to the part level through the systems engineering process. Other requirements, such as reliability, can sometimes be addressed through redundancy rather than forcing all parts to meet a reliability target.

[4] Department of Defense Instruction (DoDI) 4140.01, *DoD Supply Chain Materiel Management Policy*, March 6, 2019.

The parts management practitioner, whether in industry or the program office, needs to ensure that the correct subject matter experts (SMEs) are involved in assessing the part selection considerations listed above. While parts management practitioners should have some level of knowledge in *all* the disciplines associated with the considerations, the parts management practitioner should engage other disciplines to solicit expert assessments.[5] Using these external inputs and their own knowledge of the system and its requirements, the parts management practitioner should integrate all information to decide (1) which parts to select and (2) how to oversee the selection process.

Although industry largely selects the parts for defense systems, there are three general situations where the government sometimes selects parts—

- Direct part selection associated with a (re)design or engineering change;
- Part replacement due to the unavailability of parts during maintenance; or
- Part replacement due to new risks resulting from changes to the part itself or changes to the part's supply chain.[6]

Examples are as follows:

Direct part selection

- Initial design or major redesign. Occasionally, the government may conduct initial design or major redesign of a system without using a contractor.
- Minor redesign or engineering change proposals (ECPs) (especially for supportability) during production or sustainment. For example, minor system modifications may be made to reduce operating and support cost or make a small capability change during production or sustainment.
- Replacing a part due to an obsolescence or another availability issue during sustainment. For example, the government may face such an availability issue when performing depot maintenance in an organic facility.
- Requiring government furnished property (GFP) be used in the design.

Part replacement after changes

- After a supplier issues a product change notice (PCN) during sustainment. For example, manufacturers issue PCNs regularly. After an assessment of the change and its impact on operations, the government may select a different part.
- Change to the supply chain or support infrastructure. Events can occur after initial part selection and approval that could invalidate the part selection decision by introducing a greater risk to a DoD system. For example, there may be a buyout of a domestic supplier by a potential foreign entity owned supplier or the introduction of representatives of a potential foreign entity on a company's board of directors.

Oversight of direct government parts selection activities is also a program office parts management responsibility and is nearly identical to the oversight of contractor parts selection.[7] The parts management

[5] Some of these considerations (e.g., performance and quality) are assessed by parts management practitioners traditionally; some of these considerations (e.g., supply chain risk management (SCRM) and hardware and software assurance) are usually assessed by SMEs in other functions and these experts do not consider themselves to be parts management practitioners; and some of these considerations (reliability and maintainability) are assessed by both.

[6] This situation is analogous to the need for requalification due to changes in design or manufacturing.

[7] One key difference is that the program office controls contractor design and part selection activities through legally binding contract requirements. There is no contractual document when the government is performing those same activities, consequently a different enforcement mechanism would be needed. Another potential difference is in the

practitioner is not responsible for monitoring, detecting, or assessing part changes. That is a materiel management responsibility. The role of the parts management practitioner is to encourage these functions be performed.

1.2 Importance and Applicability

Parts management is applicable throughout a product's life cycle from prototyping to engineering models to advanced development to production and to sustainment. Therefore, parts management applies to several of the acquisition pathways wherever parts are selected. While the extent of parts selection may vary, Urgent Capability Acquisition (UCA), Middle Tier Acquisition (MTA), Major Capability Acquisition (MCA), and even Defense Business Systems pathways all require parts management. For those acquisition pathways where timelines are accelerated, parts management becomes more critical.[8]

While the following uses MCA terminology, equivalent concepts apply to the other pathways. Due to the long-lasting impact of the selection of key parts, parts management processes should be in place by the preliminary design review (PDR). Some part selections will have been made by PDR. High level part specifications should generally be understood at this phase of acquisition in instances where parts have not yet been selected and plans should be in place to address any knowledge gaps. Necessary test and analysis assets should also be identified.

At critical design review (CDR), although design work may not be complete, parts qualification methodologies and plans for additional tests and analyses should be in place. Parts reliability and quality should be assured for selections that have been made. Risk mitigations for restricted parts, parts being used outside of their specifications, and manufacturing processes should also be in place.

Parts management continues to be important during production, operation, and support. For example:

- Part changes may happen because of obsolescence or other supply chain issues;
- PCNs may be issued;
- Production lot variations may occur; or
- Engineering changes of various scopes may be implemented.

It is imperative that parts management planning and activities be reviewed and adjusted to accommodate such changes.

1.2.1 Parts Management Benefits

Disciplined parts management has generally been recognized as a contributor to the long-term success of any system. Selecting the right parts is fundamental to achieving many engineering and manufacturing objectives, influencing cost, schedule, and performance. Disciplined parts management processes improve operational readiness and reduce life-cycle costs by promoting the use of common, widely available, reliable parts.[9] For example, through disciplined parts management, the Javelin missile successfully transitioned into low rate and full rate production with limited issues.

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program office's ability to make part changes. It may be easier for a program office to influence design changes when the designer is another government organization.

[8] Concepts in this introductory material were extracted from Locker, David, "Parts Management with MIL-STD-11991," U.S. Army Capabilities Development Command Aviation and Missile Center, 2023.

[9] National Air Standard (NAS) 1524, Standardization Savings, Identification, and Calculation, supplies formulas and examples to calculate the cost of adding a part for a specific system or local organization. While some of these calculations' given variables and examples may be specific to the aerospace field, the formulas translate across all fields and can offer a framework for understanding the benefits of part standardization.

Javelin Success Story

Javelin is a portable anti-tank missile that can be used against a variety of targets by selecting the proper attack mode. It is autonomously guided to the target after launch, leaving the gunner free to reposition or reload immediately after launch. The Javelin parts management program included:

- Assessment of performance for each part, along with detailed tolerance analysis and derating criteria and
- Assembly level testing to provide assurance of part performance.

As a result, parts issues were identified early and adjustments were made to support qualification, user testing, and the efficient transition to production. Special test protocols were devised and implemented to assess long term reliability of the electronics and energetic devices. These protocols identified a systemic construction flaw in an optical sensor that would have caused significant reductions in storage life. Corrective actions were developed and implemented in time for production, and also supported other program offices use of the same sensor.

Beyond these traditional benefits, reasons for conducting more disciplined parts management have been reinforced in today's environment.

- Parts management reduces the likelihood of systems compromise resulting from supply chains for system components including hardware, material, software, data, algorithms, and humans. Compromise of a system component means that its content, function, quality, and/or reliability has been modified in some way to be something other than what the system expected. The supply chains for system components can be compromised by natural and geopolitical events or the active introduction of manipulated parts, materials, software, or information, as well as interferences with networks and processes. Similarly, the information that these systems depend on to operate can be compromised impacting the system's support and/or manufacturing. As a result, the operators of critical systems impose a myriad of restrictions on how components can be sourced to minimize the risk of compromised components finding their way into critical systems.[10]
- Disciplined parts management also reduces the likelihood that cyber attackers exploit cyber physical system vulnerabilities in software, hardware, firmware, adjacent systems in the network, energy power supplies, and user interfaces vulnerabilities and to reduce the likelihood of impact to the system's operational mission.[11] Cyber physical systems utilize technologies that combine the cyber and physical worlds in a way that can respond in real time to their environments.[12] Examples of cyber physical systems include the smart grid, autonomous vehicles, vehicle charging systems, satellite communication systems, and embedded systems. Parts management is part of a holistic approach to cyber physical systems security from a system engineering perspective. In particular, parts selection is combined with designing in required hardware and software assurance, cybersecurity attack countermeasures, SCRM, and anti-tamper in a way that evaluates threats.

[10] Extracted from University of Maryland, *Safeguarding Critical System Supply Chains Against Compromise Workshop, July 14, 2022*, December 2022.

[11] DiMase, Daniel, Zachary A. Collier, John Chandy, Brian S. Cohen, Gloria D'Anna, Holly Dunlap, John Hallman, Jay Mandelbaum, Judith Ritchie, and Ly Vessels, "A Holistic Approach to Cyber Physical Systems Security and Resilience," *2020 IEEE Systems Security Symposium (SSS)*, Crystal City, VA, 2020, 1–8, doi: 10.1109/SSS47320.2020.9197723.

[12] National Institute of Standards and Technology (NIST), "Framework for Cyber Physical Systems: Volume 1, Overview," NIST Special Publication 1500-201, 2017.

1.2.2 Consequences of Inadequate Parts Management

Similarly, there are negative consequences from inadequate parts management.

- Poor performance. The most important result of effective parts management is that parts will meet their allocated and derived requirements derived through the systems engineering process. If parts management is not performed properly, parts may not meet their requirements. For example, the system may not meet its performance requirements when actual performance specifications are aggregated to the system level.
- Improper parts utilization. Poor parts management increases the likelihood that parts will be used outside of their rated specifications. Similarly, known problematic parts (e.g., hazardous materials or known bad actors) are more likely to be selected if insufficient attention is given to part approval. Both of these situations contribute to poor performance, poor reliability, insufficient readiness, safety concerns, and increased cost.
- Poor reliability. Parts have both performance and reliability requirements. When a part does not meet its reliability requirements, it is likely that the system will also not meet its reliability requirements when overall reliability is calculated. Furthermore, poor reliability can lead to decreased readiness.
- More DMSMS issues. Poor parts management could lead to the selection of parts that are at or near the end of their life. That implies that parts may become obsolete sooner than parts that are at the earlier stages of their life cycles. In addition to affecting production schedules, there are costs associated with resolving these problems and these costs will be incurred sooner than for newer parts. If the obsolescence is not identified proactively, resolution costs tend to increase.
- Increased cost. Many of these situations lead to cost increases as noted in other bullets. Cost increases, due to ineffective parts management, are largely from the need for a resolution, which results in unplanned expenses. In addition, these unplanned expenses are almost always higher than the costs that would have been incurred if the right part had been selected initially.
- Reduced mission assurance. Ineffective parts management could lead to the selection of parts with known vulnerabilities in situations where cyber and other threat attacks are likely to be employed by adversaries. System compromise occurs when these attacks are successful.
- Increased dependence on parts without qualified alternates. Multi-source is a desirable part characteristic that is more likely to be obtained when parts management is performed effectively. Sole source situations may contribute to declining readiness and schedule slippage. Multiple suppliers decrease the likelihood that parts will become unavailable.
- Supply chain compromises. For example, counterfeit and/or maliciously tampered items could penetrate the DoD supply system especially associated with obsolete parts that are a lucrative target for counterfeiters. The cost to eliminate counterfeit parts from the supply system are high. Malicious tampering might make it easier for systems to be compromised. Another example is foreign ownership, control, or influence (FOCI). FOCI is an undesirable part characteristic. It creates opportunities for malicious tampering and loss of intellectual property which could lead to compromise as well.

Many program offices have suffered such negative consequences as described above by taking a laissez-faire approach to parts management oversight. In some cases, program offices treat problems only when they materialize and this lack of insight into parts has led to increased failures, delays in fielding, greater performance risk, additional testing, and higher cost to resolve the problem. Some actual electronic examples include:

- Use of pure tin. Failures led to short circuits which prevented assets from returning to the field.
- Supplier switch from gold bonds to copper bonds to reduce cost. Improper testing resulted in increase to field failures.

- Parts with untreated gold leads. Delayed hardware fielding.
- Parts with improper derating. Tantalum capacitor failures led to delays in delivery of hardware.
- Purchase of parts from unauthorized distributors. This situation leads to increased testing because of increased counterfeit risk.

A non-electronic example in the area of adhesive bonding is as follows. During the early years, bond-line failures disrupted a system's production line and flight tests. Problems included inadequate design, inadequate surface preparation, inadequate testing, and inadequately defined manufacturing processes. In addition, there was lack of attention to both operator and environmental variables, significantly affecting bond line integrity and causing covers or stand-off de-bonding, bracket bond failures, and de-bonding of the thermal protection system.

One program office experienced production issues due to excessively viscous silicone adhesive. The chosen adhesive for the process met all design requirements, except for the potential viscosity range. The manufacturer supplied a lot that, while it met the data sheet requirements for viscosity, was too viscous for the spray nozzles. The contractor applying it had to add solvent by trial and error. This delayed production and increased the risk that the adhesion system would fail. The part selection fix, in this case, was to have more rigid receipt inspections of incoming product, test to internal/design specifications rather than manufacturer specifications/data sheets, and to identify one or more alternatives if the standard adhesive could not be procured to design specifications for a particular batch/lot.

Another program office elected to eliminate parts management for the development phase of a new capability to be incorporated into an existing system under the assumption that parts management increased cost and slowed the development process. During the system qualification test of the new capability, a new assembly failed, requiring root cause analysis that identified several issues with the development effort. The developer had introduced ball grid array devices with lead-free solder balls while using tin-lead solder and a tin-lead solder reflow profile. The tin-lead reflow profile did not completely reflow the lead-free balls, resulting in solder joints with lower reliability. Costly rework became necessary because another part had performance issues over the required operating temperature range that was being screened with assembly level testing. In addition, one critical part in the design was obsolete. All of these issues resulted in expensive and time-consuming efforts to rebuild hardware to complete system qualification testing.

1.3 Policy and Guidance

Parts management reflects two broad types of policy and guidance: overarching and that which is pertinent to engineering design considerations across multiple disciplines. The result is a complex parts management and landscape that requires an understanding of DoD policy and guidance that spans numerous topics.

1.3.1 Overarching Policy and Guidance

The first type of policy and guidance focuses on the general procedures associated with the parts management selection process itself. It does not include all of the individual considerations that are considered and balanced in selecting a part during design, whether a new design or a redesign.

Engineering for defense systems has always included parts selection, even if it has not always been explicitly stated as such. Engineers identify parts that will meet the allocated and derived requirements for system elements by balancing various design considerations. Part selection is an input to the configuration management process when establishing a product baseline from the functional baseline for all elements and enabling elements of a system's design.

The DoD's overarching, parts management policy is explicitly found in DoDI 5000.88.[13] DoDI 5000.88 establishes policy, assigns responsibilities, and provides procedures for applying engineering to defense systems. In section 3.6.f. "Parts Management," this policy document specifically states the following:

> *The PM [program managers] will ensure that a parts management process is used for the selection of parts during design to consider the life cycle application stresses, standardization, technology (e.g., new and aging), reliability, maintainability, supportability, life cycle cost, and diminishing manufacturing sources and material shortages. As applicable, parts management requirements should be specified in the RFP's statement of work for the Technology Maturation and Risk Reduction (TMRR), Engineering and Manufacturing Development (EMD), and production acquisition phases.*

As is the case for parts management policy, parts management guidance is included in engineering guidance, most importantly in the following guidance documents associated with DoDI 5000.88:

- Engineering of Defense Systems Guidebook.[14] This guidebook describes the activities, processes and practices for program managers, systems engineers, and other defense acquisition personnel during systems development, which includes pre-material development decisions and each of the acquisition pathways. Appendix A.1 summarizes parts management content corresponding to the acquisition pathways.
- Systems Engineering Guidebook.[15] This guidebook describes systems engineering guidance and best practices for program managers and systems engineers with DoD acquisition program responsibilities. Appendix A.2 indicates where parts management content is located.
- Department of Defense Systems Engineering Plan (SEP) Outline.[16] This guidance document describes the structure and content of an SEP. Parts management is included in a mapping of design considerations into contracts (in Table 2.5-1 of the SEP). See Appendix B for some examples of parts management-related questions that can be used to prepare for systems engineering technical reviews and integrated logistics assessments.

1.3.2 Policy and Guidance Pertinent to Engineering Design Considerations

The second type of policy and guidance is that which is pertinent to engineering design considerations. The selection, procurement, and use of parts for DoD systems must examine and balance numerous engineering design considerations. During parts selection, an engineer determines how each design consideration affects the allocated and derived requirements (e.g., performance specifications, physical characteristics, and risk reduction) for the part to be selected.

Design considerations fall into three categories. One category, systems engineering, includes the application of traditional design considerations, such as reliability, maintainability, supportability, manufacturing, and quality, as part of the design process for a DoD system. The other two categories—system security engineering and SCRM—represent relatively new areas of growing importance, due to their potential impact on DoD system designs. Appendix A.3 through A.5 contain additional information on

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[13] DoDI 5000.88, *Engineering of Defense Systems,* November 18, 2020.

[14] Office of the Under Secretary for Research and Engineering, Office of the Deputy Director for Engineering, *Engineering of Defense Systems Guidebook*, February 2022.

[15] Ibid.

[16] Office of the Deputy Director for Engineering, *Department of Defense Systems Engineering Plan (SEP) Outline*, Version 4.0, September 2021.

the policy and guidance documents pertinent to the relevant design considerations across the three categories.

1.4 New Parts Management Paradigm and Vision

Given the benefits of disciplined parts management and the potential consequences of laissez faire parts management oversight, this document conveys guidance on a new parts management paradigm with the following overarching vision—

> **Overarching Parts Management Vision**
>
> The more disciplined selection, procurement, and usage of parts on DoD systems to meet system requirements while balancing the costs and risks associated with parts selection considerations, such as: performance, quality, qualification, reliability, maintainability, supportability, standardization, technology features and life-cycle stage, manufacturing processes and producibility, DMSMS risk, system security, cyber weaknesses and vulnerabilities, hardware and software assurance, supply chain risk, susceptibility to counterfeiting, unauthorized tampering, and use of hazardous materials.

Under this new paradigm, the vision can be achieved by:

- Increasing the level of discipline applied in program office part selection oversight by emphasizing and applying the practitioner-oriented best practices found in this document, MIL-STD-11991, and the Standardization Document 26 (SD-26), *DMSMS and Parts Management Contracting Guide* .[17] In nearly all circumstances[18] throughout the life cycle of most DoD systems, program offices should develop and implement a government program office Parts Management Program and Plan[19] that takes a risk-based approach to part selection oversight. That risk-based approach encompasses
    - Establishing part selection requirements based on an appropriately tailored MIL-STD-11991[20] that meets the needs of the program office and
    - Determining the level and extent of part selection review and approval that will be performed by the program office.
- Collecting and analyzing records on parts selection oversight activities and their effect on cost, schedule, and performance.
- Obtaining data on the part selection considerations and using tools for analyzing that data in support of those best practices.

1.5 Elements of a Program Office Parts Management Program

Under the new paradigm, a program office Parts Management Program encompasses all of the activities, processes, and procedures that a program office carries out to accomplish its overarching parts

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[17] SD-26, *DMSMS and Parts Management Contracting Guide*, Defense Standardization Program Office (DSPO), June 2023.

[18] In certain highly critical, sensitive, and technically complex situations, more rigorous part selection requirements should be imposed. Lesser requirements may be needed when part selection is minimal and the program office has confidence in the part selection processes.

[19] This program office Parts Selection Plan is different than the currently used contractor Parts Selection Plan. The contractor Plan encompasses the processes to select parts. The program office Plan will oversee those processes and their results.

[20] No mention of MIL-STD-3018 is made in this document because its cancellation is planned. In the future, reference can be made to the general requirements of MIL-STD-11991 instead of MIL-STD-3018.

management objectives for every system being acquired/supported. There are four principal elements of a program office Parts Management Program.

- Risk Assessment: Assessing the specific risks associated with parts selection, procurement, and use on the system.
- Oversight: Determining the type and extent of program office oversight necessary to reduce risk to an acceptable level.
- Subject Matter Expertise: Identifying and securing additional subject matter expertise to conduct oversight.
- Parts Management Plan: Developing, approving, and implementing a risk-based program office Parts Management Plan to
  - Oversee a contractor's parts management activities (normally detailed in a contractor Parts Management Plan)[21] intended for the selection of parts for system designs and part changes made during production and sustainment (operations and support).[22]
  - Ensure sound parts selection, procurement, and usage when: (1) Design or sustainment activities (including part selection) are performed organically by the government *and* (2) When another (either government or non-government) organization has selected some parts. Examples include the use of GFP or situations where the design or sustainment activities build on an already developed prototype.
  - Mitigate the risks associated with changes to the supply chain or the vulnerability of parts already selected for use on the system.[23]

If a program office manages the acquisition and/or support for multiple systems, the program office should apply each of these elements separately for each system. In addition, a program office should apply each element separately to every contractor selecting parts for the system. This is important, because whether a system is being developed, modified, manufactured, or sustained can imply different part selection risks, varying needs for subject matter expertise, and diverse levels of rigor for a program office Parts Management Plan. It is not uncommon for a program office to simultaneously have contractors for development, production, and/or sustainment.[24]

In DoD, a program office's principal parts management activity is oversight over contractor parts management activities because contractors select parts during the design and production stages of the life cycle in most circumstances. Contractors can also perform a substantial amount of parts management activities during sustainment (e.g., performing maintenance, changing manufacturing processes, resolving obsolescence issues, avoiding lead time disruptions, rectifying performance degradations, developing post-production engineering changes and redesigns, adding meeting new requirements); however, the degree of contractor involvement depends on the system.

1.6 Organization of this Document

Sections 2 through 5 discuss the four elements of a program office Parts Management Program. Sections 2 through 4 involve preparation for a program office Parts Management Plan, which is the subject of Section 5. Program office Parts Management Plan record keeping is explained more broadly in Section 6

[21] While the program office Parts Management Plan focuses on part selection oversight, the contractor Parts Management Plan is primarily concerned with the part selection processes themselves.

[22] This excludes tracking or reacting to situations that may occur where there is no deliberate part replacement (i.e., the part number remains the same) but something about the part changes and that change introduces a new risk associated with continuing to use the part. This situation is covered in the third bullet.

[23] Examples of this include the discovery of a vulnerability to cyber-attack or a replacement of a sub-tier supplier or a change in a sub-tier supplier's ownership or management structure.

[24] Multiple contracts for similar functions on a system may have identical program office Parts Management Plans.

of this document. Section 6 suggests potential records to keep and metrics to use. Finally, Section 7 discusses parts management support tools, services, and training.

Section 2. Conducting an Initial Risk Assessment

The initial risk assessment provides a basis for two key elements of parts selection oversight:

- Tailoring the requirements of MIL-STD-11991 to the specific needs of the program office and
- Determining the level and extent of a program office's parts selection review and approval.

The initial risk assessment gives program managers a means to prioritize resource requirements. While risk may change with the threat environment, suppliers, and regulations, the *initial* assessment reflects a baseline need for oversight resources to mitigate the risks to an acceptable level. If this level of resources is not provided, a program office should conduct additional risk assessments to understand the level and extent of oversight that can be applied and highlight to decision makers the additional risk resulting from inadequate resourcing.

Because rigorous oversight over all aspects of the system may not be needed, as part of its risk assessment, a program office should create risk-based aggregations of parts (typically by subsystem which is the term this document will use) that may need special attention and different levels of oversight (discussed in Section 3). Risk determination and aggregation is at the discretion of the program office based on the complexity of the system, system requirements, the extent of quantitative risk information available, part criticality, and mission criticality. Too high a level of aggregation could lead to inadequate attention being focused on critical parts within that group.

Subsections 2.1 and 2.2 respectively describe a less complex and a more complex risk determination and aggregation approach that may be used and tailored to the unique parts within the system. Subsection 2.3 suggests a way to refine those approaches further to help determine the level of special attention that should be given to parts within a subsystem.

2.1 Risk Determination and Aggregation using Subject Matter Experts

Since risk determination and aggregation are highly complex and dependent upon a system's design, missions, and operating environments, this first approach relies heavily on SMEs. The experts should first identify the critical system functions and the subsystems used to perform those functions. For many systems, these critical functions are those involved with:

- Information communication technology,
- Propulsion,
- Fire control,
- Sensors, or
- Command and control.

To generate a list of subsystems where part selection risks are highest, these lists of critical functions and subsystems should be further refined (through both additions and subtractions) by the SMEs because of their knowledge of

- The system itself,
- Missions,
- Operating environments, and
- Threats.

The concept of different risk tolerances as a function of mission may be an overriding consideration by the SMEs. The space community uses four risk tolerance levels when determining the level and extent of a program office's parts selection review and approval.[25]

- Minimum practical,
- Low,
- Moderate, and
- High.

To supplement subject matter expertise principally for information communication technology (ICT), the program protection plan (PPP) identifies ICT subsystems needing protection. Program protection planning identifies critical program information (CPI), threats to CPI, and the associated risk and then determines those critical subsystems/components where protection measures are needed. The box below provides formal definitions.

Program Protection Definitions

Program protection is: "The integrating process for managing risks to DoD warfighting capability from foreign intelligence collection, from hardware, software, and cyber vulnerability or supply chain exploitation, and from battlefield loss throughout the system life cycle."[a] Program protection planning identifies CPI, threats to compromise CPI, and the associated risk. It is DoD policy that: "CPI will be identified early and reassessed throughout the RDT&E program so that CPI protections requirements and countermeasures may be identified and applied as the CPI is developed and modified throughout the life cycle as needed." In addition, "CPI protection measures will be integrated and synchronized, then documented within the PPP in accordance with [DoDI 5000.02[b]].[c]"

CPI are: "U.S. capability elements that contribute to the warfighters' technical advantage, which if compromised, undermines U.S. military preeminence. U.S. capability elements may include, but are not limited to, software algorithms and specific hardware residing on the system, its training equipment, or maintenance support equipment."[d]

[a] Defense Acquisition University, DAU Glossary, "program protection."

[b] DoDI 5000.02, *Operation of the Adaptive Acquisition Framework*, January 23, 2020.

[c] DoDI 5200.39, *Critical Program Information (CPI) Identification and Protection Within Research, Development, Test, and Evaluation (RDT&E)*, May 28, 2015, incorporating change 3, effective October 1, 2020.

[d] Ibid.

In practice, there often are some additional critical areas, not explicit in the PPP, that are similarly vulnerable to exploitation in a way that degrades the level of assurance. For example, every subsystem using logic-bearing microelectronics devices will typically not be explicit in a PPP. Reasons for such omissions include:

- Identifying subsystems associated with CPI is partially subjective;
- The PPP may not be current;[26]

[25] Aerospace Report No. TOR-2011(8591)-21, Mission Assurance guidelines for A-D Mission Classes, June 3, 2011.

[26] A good practice to help mitigate this situation is the inclusion of a PPP update process in the Life Cycle Sustainment Plan (LCSP).

- Program offices often attempt to minimize CPI because of constraints on funding and people; and
- The scope of program protection activities could be limited because other system security engineering disciplines have primary responsibility in a particular organization.[27]

Therefore, a program office should supplement PPP-derived subsystems with other subsystems identified by SMEs from all of the system security engineering disciplines as discussed above.[28]

2.2 Risk Determination and Aggregation through a More Formal Analysis

Steps in a more formal risk assessment could be as follows.

1. Identify and organize part selection risks and risk tolerances to be considered in a program office Parts Management Program;
2. Classify the identified risks by likelihood and severity of consequence; and
3. Aggregate risks by subsystem (or possibly some other grouping of parts).

These steps are shown in Figure 1.

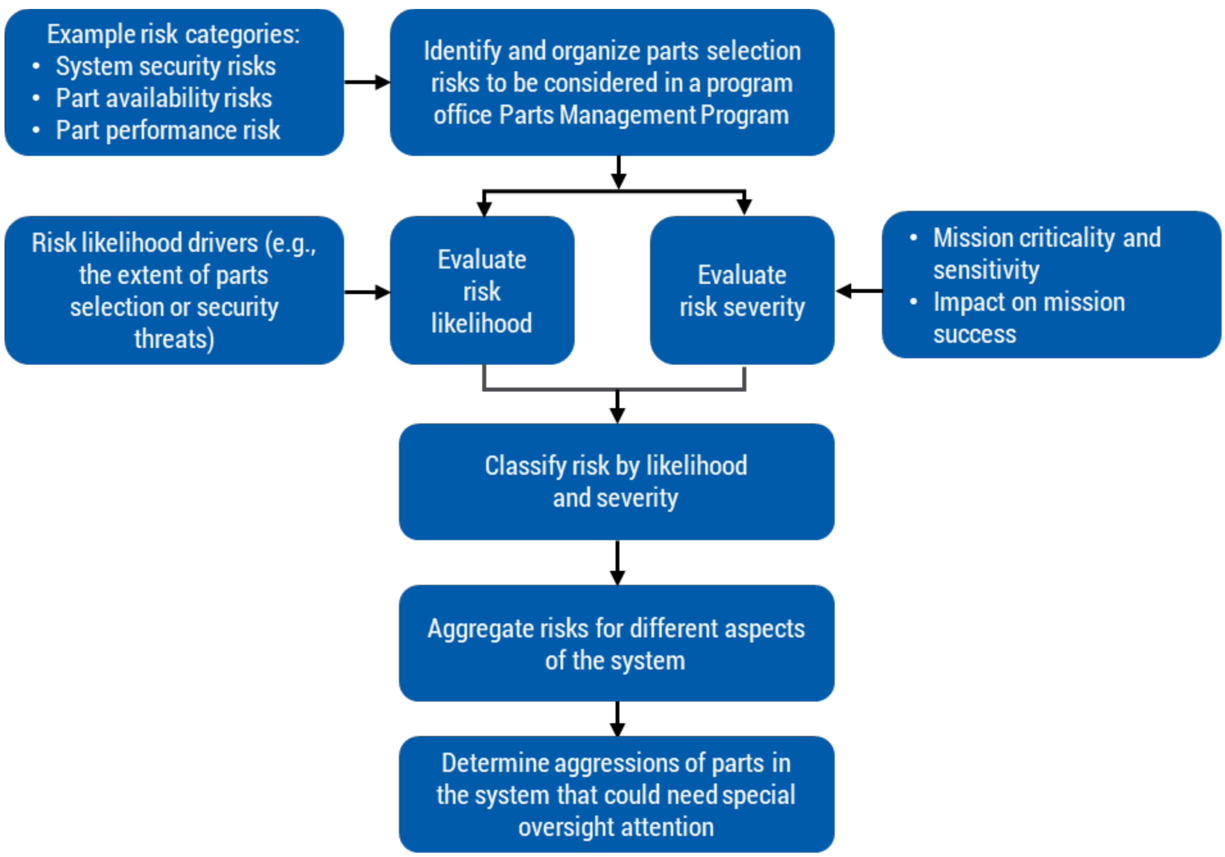

Figure 1. Initial Formal Risk Assessment Steps

[27] This situation could also be mitigated in the LCSP by scoping the update process to encompass all system security engineering disciplines.

[28] While it would be good if this were a standard system security engineering process, it may be necessary to seek information about the need for additional protection on a case-by-case basis.

2.2.1 Risk Categories and Types

Evaluating the risks associated with inadequate parts selection begins with the identification of potential risks. The following is a representative list of risk categories[29] and associated risks that may be used. There may be overlaps between the categories and among the risks within and across the categories. The risk categories themselves may be defined differently in other DoD policy and guidance; however, these differences do not impact the parts management function which relies primarily on the existence of the risks. Depending on the circumstances of the specific system involved, additional parts management risks from the program office's risk register should be added to the following.

Part performance is the first risk category and it is also a traditional focus of parts management oversight. Other disciplines are concerned with these risks as well. Part performance risks include:

- Inadequate reliability or maintainability
- Inability to meet requirements in all pertinent operating environments
- Lack of supplier quality
- Inadequate design
- Inadequate qualification and testing
- Inadequate manufacturing processes
- Improper application/use of soldering processes and materials
- Improper parts derating
- Use of prohibited parts
- Adverse impact to operating environment (e.g., humidity causing corrosion).

The second category is system security risk. Such risks have been given high attention in recent years, but parts management practitioners traditionally limit their efforts to trying to ensure that system security or cyber engineers consider such risks. Program offices should prevent situations where the parts management and/or the parts approval function incorrectly assumes that system security risks have been examined by SMEs. Consideration of all part selection risks should be a parts management oversight responsibility. System security risks include:

- Known weaknesses and vulnerabilities
- Unsecure networks and systems
- Inadequate hardware and software assurance
- Inadequate traceability
- Unprotected information
- Malicious intrusions
- Anti-tamper[30]
- Unsecure design.

[29] Other categories may be used.

[30] Anti-tamper is defined as: systems engineering activities intended to prevent or delay exploitation of CPI in U.S. defense systems in domestic and export configurations to impede countermeasure development, unintended technology transfer, or alteration of a system due to reverse engineering.

The third risk category is parts availability. Parts management practitioners have traditionally considered these risks when oversight is performed. Some of these risks are considered and overseen by other disciplines. Part availability risks include:

- DMSMS and their root causes (e.g., financial viability of the suppliers, market for the part, technological advances, …)
- Hard to find parts
- Long lead times
- Counterfeits
- Cost
- Use of hazardous material
- FOCI
- Sole sources
- Lack of standardization
- Increased range of parts to be made available in the wholesale supply system.

Determination of risk should not be limited to the weapon system itself. Associated test and support equipment should also be considered when they are part of the same contract. Parts used on such equipment can impact the larger system mission, life-cycle cost, and readiness. For example, poor parts selection for test equipment may generate invalid test results which in turn may impact reliability and performance in an actual mission.

2.2.2 Evaluating Risk Likelihood

Likelihood criteria are often portrayed on a five-level as shown in Table 1 extracted from the Risk, Issue, and Opportunity Guidebook.[31]

Table 1. Levels of Likelihood Criteria

Level	Likelihood	Probability of Occurrence
1	Not Likely	~10%
2	Low Likelihood	~30%
3	Likely	~50%
4	Highly Likely	~70%
5	Near Certainty	~90%

The following bullets describe overlapping risk drivers that a program office should consider when determining the likelihood of applicable risks at any point in the life cycle.

- ***Extent of design (and therefore part selection and procurement) activities.*** If there is absolutely no part selection, due to no design or limited design (e.g., a repair contract where the contractor has no authority to change parts), then parts management contract requirements and associated oversight can be minimal. However, it is important to recognize that system designs and their component parts typically change over time.
- ***New or different parts may be introduced to a system design.*** As more parts are selected or changed, there is an increased likelihood that the consequences of those parts not meeting their requirements may be significant. There are numerous reasons for part

[31] Office of the Deputy Assistant Secretary of Defense for Systems Engineering, *Department of Defense Risk, Issue, and Opportunity Guidebook*, January 2017, section 3.3.2.

changes. (1) A part manufacturer may replace one part with a newer version and may or may not change the part number.[32] (2) There are situations where the process to make the part changes or the suppliers change. (3) Parts may no longer be available and an equivalent part that may or may not be mentioned on the drawing may be used.

- ***Possibility of major or minor configuration/ECPs being made.*** This driver is closely associated with the extent of design activities anticipated during production and sustainment. If there are only minor (alias class II) engineering changes, then a lower level of oversight may be appropriate because the likelihood of part changes (and their associated risks) would be lower. For major (alias class I) changes, more oversight is desirable, since the risk likelihood should be greater when the ECP scope increases. As shown in the box below, major changes will impact the system's capability. The parts selected for such major changes are also more likely to be critical and have higher consequences if they do not meet their allocated and derived requirements.

Definition of Major (alias class I) ECP

An ECP proposing a change to approved configuration documentation for which the government is the CDCA [Current Document Control Authority] or that has been included in the contract or statement of work by the tasking activity, and:

(1) affects any physical or functional requirement in approved functional or allocated configuration documentation, or

(2) affects any approved functional, allocated or product configuration documentation, and cost, warranties or contract milestones, or

(3) affects approved product configuration documentation and one or more of the following:

(a) government furnished equipment,

(b) safety;

(c) compatibility, interoperability, or logistic support;

(d) delivered technical manuals for which changes are not funded;

(e) will require retrofit of delivered units;

(f) preset adjustments or schedules affecting operating limits or performance to the extent that a new identification number is required;

(g) interchangeability, substitutability, or replaceability of any item down to non-repairable subassemblies;

(h) sources on a source control drawing; and

(i) skills, manning, training, biomedical factors or human engineering design.

Source: Military Handbook (MIL-HDBK)-61A(SE), *Configuration Management Guidance*, February 7, 2001.

- ***Life-cycle phase and acquisition pathway.*** As indicated above, all contracts with design activities (whether they be initial design, redesign, or smaller ECPs) involve part selection which may impact risk likelihood.
  - Parts selection is clearly of interest during the development phase.
  - Parts also change during production and, possibly to a lesser extent, during sustainment, when obsolescence can be a principal driver for the selection of new parts to replace those parts that have gone out of production and/or are no longer available.

[32] The parts management document uses the term part number exclusively and does not refer to item numbers. There are two types of part numbers. The original component manufacturer (OCM) part number is the number assigned by the manufacturer of the part. The original equipment manufacturer (OEM) part number is assigned by the OEM of the parent assembly of the OCM part.

- Spares procurement contracts, on the other hand, generally have fewer part changes.

The acquisition pathway also can impact the amount of parts selection required.

- Service contracts have very little part selection, unless they are associated with providing system maintenance.
- The amount of parts selection through the software acquisition pathway is similarly small.
- Very little parts selection takes place for UCA pathway programs, because the development effort is minimal and deployment ends in less than two years from the start of development.
- The MTA pathway could have significant development activity during rapid prototyping unless the system transitions immediately to rapid fielding. In other situations, the MTA pathway can transition to the MCA pathway where parts selection is substantial. In general, greater parts selection implies greater risk likelihood and the need for more oversight.

- ***Threats to and opportunities for system compromise.*** In addition to a part not meeting quality, performance, and supportability specifications, a part may not meet requirements due to *external* factors by which a part can become compromised. External factors include adversary exploitation of vulnerabilities and weakness, malicious tampering or counterfeits, protections designed into the system, and the likelihood that the system will be operating in an environment where there are threats to these external factors.
- ***Design control.*** When a contractor has design control, a program office may not be able to influence parts selection; however, even in such situations, this does not mean that the government will never assume design control in the future. Therefore, there may be situations where the contractor has full control of a system's design, but the program office retains some level of oversight on part selection as a future contingency to minimize design control risk. When that is the case, all other risk likelihood principles apply.
- ***Use of commercial-off-the-shelf (COTS) assemblies or non-developmental items (NDIs).*** Similar to "design control," the use of a COTS assembly or NDI may have an impact on risk likelihood. Risks associated with parts internal to COTS/NDI may not be known or may not be easily attainable. Furthermore, it may be very difficult or expensive to address such risks when they are found. Depending on the criticality, sensitivity, or vulnerability to compromise, different oversight mechanisms (e.g., obtaining and assessing the risks associated with the COTS/NDI bill of material [BOM]) may be employed.
- ***Use of GFP or government developed prototypes.*** Risk is a function of the extent of parts selection discipline that the government imposed in development of the GFP or prototypes. While all program offices should apply disciplined parts management, a new development program may use GFP or prototypes that were not subject to the same level of rigor. If the parts management discipline was inadequate, risk will also be affected by the extent to which the receiving program office can and does take corrective action where needed after the fact.

2.2.3 Evaluating Risk Severity

The Risk, Issue, and Opportunity Guidebook also contains a matrix with consequences associated with cost, schedule, and performance.[33] While that breakdown is appropriate for parts management, the criteria for determining a risk level may not be fully applicable. Consequence levels in that matrix are minimal impact, minor impact, moderate impact, significant impact, and critical impact. A program office should define its own criteria based on its specific situation.

The mission of a system along with negative consequences to that mission are important aspects of risk severity. In addition, life-cycle cost or readiness impacts can result from a part being compromised, a part being unavailable, or a failure of the part to perform adequately or reliably. There are a number of

[33] Ibid, Section 3.3.1.

interrelated considerations that provide subjective data for evaluating the severity of the risks from part selection. These considerations along with those discussed above for risk likelihood drive a program office's initial decision on the extent of parts management oversight it should perform.

- ***Reliability requirements.*** This consideration, especially when the performance requirements are demanding, indicates a situation where the system missions and operating environments drive the need for high reliability parts. When high reliability is critical to mission success, the consequences of a part failure are high and therefore the extent of oversight should be greater. However, such performance requirements do not always drive the inclusion of system reliability requirements in the contract. Unreliable parts (which often are less costly parts) may meet performance requirements, but rigorous oversight should minimize their use.
- ***Complex, critical, or sensitive functions.*** Parts selection associated with this consideration indicates circumstances where the risk severity might be much higher, and therefore, parts management oversight should also be more rigorous. One such circumstance is a critical (either mission critical or safety critical) function. Rigorous parts management is more important when mission assurance is critical. The same is true for sensitivity, which refers to security classification or communications. A part not meeting its requirements could compromise information that leads to significant repercussions. Technically challenging functions, including operations in harsh environments, are often related to critical or sensitive operations.
- ***Long-life systems with minimal planned changes.*** The extent of parts selection for systems with this characteristic impacts the supportability of the system. Selection of high quality and reliable parts, not near obsolescence, generally lowers life-cycle cost and tends to increase readiness. Therefore, there may be greater severity of poor parts selection in these somewhat stable situations and the level of oversight (and associated contract requirements) should reflect those consequences.
- ***Life-cycle cost.*** In addition to complex, critical, or sensitive functions, systems with unnecessarily high life-cycle cost as a consequence of inadequate parts management imply that parts selection oversight should be more rigorous. High cost could be a function of poor reliability, inadequate quality, or design characteristics driven by parts selection.
- ***Use of COTS assemblies or NDIs.*** This consideration was also listed as a driver of risk likelihood. In one sense, a COTS assembly or an NDI must meet its allocated and derived requirements just like any part. If requirements are not met, then the consequences of a failure must be identified. Factors such as criticality, sensitivity, and vulnerability to compromise should be considered.

2.2.4 Aggregating Risk by Subsystem

Working with a long list of risk likelihoods and severities may impede decision-making about the appropriate level of oversight. It may be useful to identify subsystems (or some other grouping of work breakdown structure[34])[35] where those lists can be aggregated into a single, overall likelihood and severity.

The aggregation may begin with an evaluation of the likelihood and severity of each individual risk followed by a combining of all the risks to the subsystem level. For example, there may be a sufficient portion of the individual risks with high likelihood or severity to assign an aggregated likelihood or severity to the subsystem. Something similar could be done for a combination of low likelihood or severity individual risks. If there were no clear way to combine the individual risks, then the subsystem

[34] MIL-STD-881C, *Work Breakdown Structures for Defense Materiel Items, Standard Practice*, October 3, 2011.

[35] Parts themselves have not yet been selected at this stage of the risk analysis.

aggregation could be medium.[36] These examples assume that all individual risks are weighted equally. Alternatively, a weight could be assigned to each individual risk when aggregating to the subsystem level.

Aggregation facilitates a determination of the level of program office oversight to be applied to contractor part selection. The term *subsystem* is used somewhat generically. While subsystem is a convenient way to aggregate, more fundamentally the parts needing special attention are identified to enable focus on a smaller subset of items where more than normal oversight is needed.

2.3 Further Refinements to Risk Determination

Simply having a list of high-risk subsystems may not be sufficient to determine level and type of oversight since there are variations in how oversight is performed. The same level and type of oversight may not be appropriate for every high-risk subsystem and for every part within those subsystems. This section provides the program office with considerations for further prioritizing these subsystems and parts to enable better oversight differentiation.

The first consideration should be the Military Department determination of part criticality. It may be appropriate to apply less rigorous oversight to non-critical parts. Part criticality may be further refined by separately categorizing parts associated with Technology Area Protection Plans, Science and Technology Protection Plans, and PPPs.[37]

Another consideration is part complexity. Complex microelectronic parts such as application specific integrated circuits or microcontrollers may be given more rigorous oversight. The same applies to programmable devices such as field programmable gate arrays.

Mission criticality is a third differentiation factor. Parts associated with subsystems involved in national defense missions with the highest criticality should receive greater levels of oversight. Similarly, parts identified with the most important missions for the system itself (but not at the national defense level) may be given greater oversight than other critical parts.

After all of these considerations are taken into account, the parts associated with high-risk subsystems will be divided into prioritized groups for which different levels of oversight may be required.

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[36] The approach uses a three-level scale for likelihood and severity as compared to the five-level scales mentioned earlier. One way of reducing the five-level likelihood scale to three levels is to classify not likely and low likelihood as low, likely as medium, and highly likely and near certainty as high. For the three-level severity scale, high could represent critical or significant impact, medium could represent moderate impact, and low could represent minor or minimal impact.

[37] DoDI 5000.83, *Technology and Program Protection to Maintain Technological Advantage*, May 21, 2021.

Section 3. Considerations In Determining Type and Level of Program Office Oversight

Section 3 discusses *considerations* for deciding the specifics of the parts management oversight to be performed by the program office (i.e., what to do). These considerations should not be viewed as binding requirements. The program office should establish the level and type of oversight based on achieving its desired level of assurance that parts meet their allocated and derived requirements given the existing circumstances. Section 4 covers the subject matter expertise needed to perform the oversight and Sections 5 and 6 provide guidance on how the oversight should be performed.

3.1 Overview

The program office's parts management oversight will be performed on contractors and the outputs of contractor parts management activities. This oversight must ultimately be enabled and based on contract requirements to perform specific parts management functions. Prior to formulating these contract requirements, the program office should have:

- Identified and classified the risks that are most important for its contractors to consider in the selection of parts;
- Determined the oversight activities it plans to perform based on the likelihood and severity of those risks and associated oversight cost; and
- Obtained reports and data to enable those oversight activities.

Once the part selection risks have been evaluated and the likelihood and severity have been determined, a program office should find a way to ensure that the amount of oversight is consistent with this determination. Program offices should recognize that although the type and level of oversight impacts cost, acquisition cost increases for parts management are historically minimal while delivering substantial benefits in system life-cycle cost. Acquisition cost increases should not drive reduced priority to sustainment concerns.

The risk assessment will inform an initial determination[38] of the level of program office oversight necessary over the contractor's parts management activities. Therefore, the risk assessment assists a program office in answering the following types of questions.[39] The questions are organized around the types and levels of oversight activities the program office may perform and are used to determine the desired level of effort associated with those activities.

- What is the program office's desired level of assurance that parts meet their requirements as a function of risk?
- Does the program office want to receive and approve a contractor Parts Management Plan?
- Does the program office want to impose further process requirements?
- To what extent does the program office want to specify part requirements and prohibitions?[40]

[38] The final determination of oversight activities will be articulated in the program office Parts Management Plan. Changes from the initial determination may be the result of unavailability of the requisite government subject matter expertise or a decision to accept greater risk in the part selection process. Greater oversight intensity implies lower risk that the parts do not meet all the program office's objectives or equivalently, less rigorous parts management objectives.

[39] The order of these questions is generally aligned to the illustrative requirements in the SD-26.

[40] Note that how the contractor should select parts is generally not a contract requirement. That function is inherent in the systems engineering process by which parts are selected to meet a design in a way that satisfies all system requirements.

- Does the program office want to verify that a contractor is following the processes in its Plan?
- What data should be reported to the program office and what reviews and inspections should the program office conduct to enable it to verify that the contractor is following the processes in the contractor Parts Management Plan?
- Does the program office want to validate the effectiveness of the contractor's parts management processes?
- Should the validation efforts vary? Same for all parts? Focus on critical parts? Tailored for different aspects of the system?
- What data should be reported to the program office and what reviews and inspections should the program office conduct to enable it to validate the effectiveness of the processes in the contractor Parts Management Plan?
- What parts does the program office want to approve before the parts selected are used in the system?
- What information should be included in the request for part approval?
- What records does the program office want to maintain and what metrics does the program office want to derive from those records?

Figure 2 represents both the first and second steps of a program office Parts Management Program.

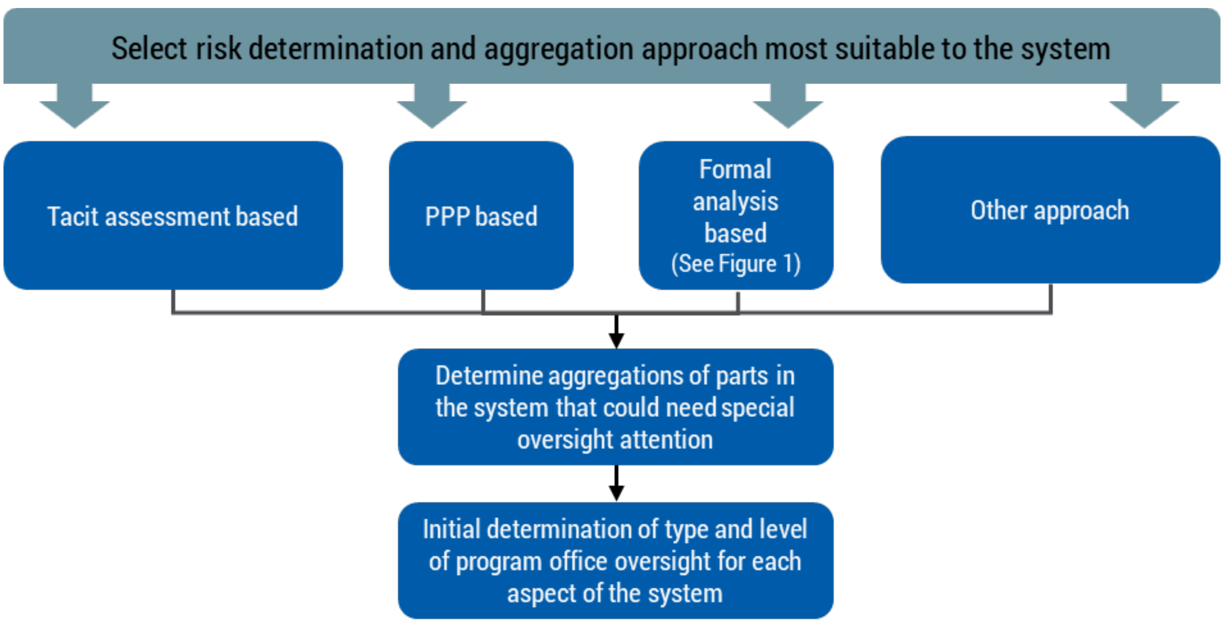

Figure 2. Type and Level of Oversight Derived from an Initial Risk Assessment

Translating the risk aggregations into answers to the above questions and ultimately a decision on the extent of parts management oversight activities by subsystem (or other grouping used) is similarly subjective and at the discretion of the program office. The new parts management paradigm is the basis for discussing oversight activities in the following two sections.

Section 3.2 covers the establishment of parts selection requirements based on MIL-STD-11991. Options include:

- No contractor Parts Management Plan required
- Require a contractor Parts Management Plan in accordance with the general requirements of MIL-STD-11991 tailored to the specific situation

- Require a contractor Parts Management Plan in accordance with the general and detailed requirements of MIL-STD-11991 tailored to the specific situation
- Supplement the manufacturing process requirements of MIL-STD-11991
- Supplement part requirements and prohibitions of MIL-STD-11991
- Replace MIL-STD-11991 with an alternative requirements document under circumstances where more rigorous requirements are necessary.

Section 3.3 discusses program office review and approval of part selections using any combination of the following:

- Verification of whether contractor is following the processes in its Plan
- Program office monitoring of contractor part selections
- Assessing the viability of parts selected that do not meet program office preferences
- Program office approval of parts
- Record keeping.

Both Sections 3.2 and 3.3 describe material that could be included in oversight. Additional details on how the oversight could be conducted is found in Section 5 which explains the program office Parts Management Plan.

3.2 Establishing Part Selection Requirements

3.2.1 Determining Whether a Contractor Parts Management Plan is Needed

Nearly all system development, production, modification, and support contracts should have a requirement for a contractor Parts Management Plan that the program office must approve. A contractor Plan may not be needed when

- There is no possibility of new or different parts being selected or used
- Parts selection activity is minimal and
  - No parts will be selected for critical/sensitive applications
  - No parts will be selected where there is an especially high consequence of failure
  - The program office has a high degree of confidence that the contractor's internal parts selection processes are adequate
  - The program office has a high degree of confidence that the contractor will follow its documented part selection processes.

Such conditions are rare. Depending on the results of its risk assessment, the program office should determine whether the contractor Parts Management Plan describes the processes for meeting either the general requirements or all (general and detailed) requirements of MIL-STD-11991.

3.2.2 Tailoring MIL-STD-11991 Requirements

Some considerations for limiting the contractor Parts Management Plan to the general requirements of MIL-STD-11991 are as follows:

- The system is expected to perform minimal or no critical/sensitive functions and program office approval is required for parts associated with those critical/sensitive applications
- There are minimal or no system applications with an especially high consequence of failure and program office approval is required for parts associated with those applications where there would be a high consequence of failure

- The program office wants to reduce the burden on the contractor and therefore the government accepts any implied risk
- The program office was not able to secure the required level of effort for SMEs to oversee the detailed requirements of MIL-STD-11991 and therefore the government accepts any implied risk.

The program office should recognize that production and support contracts may involve parts selection if approved parts become unavailable. Therefore, a tailored contractor Parts Management Plan may be applicable and the program office may limit the Plan to the general requirements of MIL-STD-11991. If the contract contains a requirement that the program office must approve the use of all parts that have not been previously approved in drawings or similar documents, then the Plan could be limited to the program office approval process itself. Another contract option, in lieu of a formal approval process, is to require a program office determination of what to do when a part is not available.

Subcontractors selecting parts for the system (often in the first two tiers below the prime contractor) should also be required to prepare a Parts Management Plan as part of the flow down of contract requirements. In some cases, subcontractors accept the prime contractor Parts Management Plan and therefore no independent document is produced. In other situations, subcontractors develop separate Plans.

Regardless of whether only the general requirements or all requirements of MIL-STD-11991 are invoked, the contractor Plan should describe how the contractor intends to address those requirements along with:

- Requirements stated elsewhere in MIL-STD-11991 when referenced by either the general or detailed requirements (e.g., when the general requirements indicate that the requirements in an appendix apply) and
- Other parts management requirements explicitly included in the contract that add to, modify, or replace MIL-STD-11991 (e.g., inclusion of other commercial standards, requirements associated with problematic additive manufacturing[41] processes, exception reporting, finishes and coatings, soldering, …).

The contractor Plan should exclude any MIL-STD-11991 requirements that the program office eliminates to remove unnecessary, overly costly, and/or burdensome requirements based on the results of the risk assessment.

This alignment with MIL-STD-11991 does not imply that the level of detail found in the contractor Parts Management Plan is similar across program offices. The program office should tailor the requirements for the Plan for the specific situation. The program office may explicitly include requirements that add to, modify, or replace those in MIL-STD-11991. Often these changes are made to add emphasis in a way that improves the likelihood of avoiding situations that experience has shown lead to problems when the system is fielded. Sometimes these changes eliminate requirements that do not apply to the system.

Finally, tailoring of the Plan may be proposed by the contractor. The contractor Parts Management Plan may suggest alternative ways to meet a MIL-STD-11991 requirement. The program office acceptance of the proposed alternative will be indicated by an approval of the Plan.

Oversight may be limited to review and approval of the contractor Parts Management Plan. If the program office does intend to limit its oversight in that way, the contractor Plan could be based on either the general or both general and detailed MIL-STD-11991 requirements per the criteria discussed above.

[41] The program office may want to clarify the definition of a part for additive manufacturing. For example, part specification should include process control for key variables and materials, feedstock, quality, and meeting application requirements.

However, even when the general requirements may be sufficient, the detailed requirements could be included to add rigor to the contractor's processes in the limited oversight situation.

3.2.3 *Establishing More Rigorous Part Selection Requirements*

Based on lessons learned, some program offices have determined that minimum part selection requirements should exceed those of MIL-STD-11991 because of the criticality and/or demanding nature of the system's missions. In those situations, the contractor Parts Management Plan should be based on documents most appropriate to the specific situation. In the case of the Missile Defense Agency (MDA), for example, an internal document is used instead.[42]

3.3 Determining the Level and Extent of Program Office Part Selection Review and Approval

3.3.1 *Monitoring*

Under nearly all circumstances where oversight is deemed important, it should include the monitoring of contractor part selections through a review of parts lists and their specifications as early as possible. Timeliness is key; unless the review is very soon after the time of part selection, the development process may be impeded and costs could increase when parts are rejected. Monitoring contractor part selections is one of the most important elements of program office oversight, especially when there is limited or no government parts approval. Under those circumstances, monitoring may be the program office's only opportunity to examine parts lists. Benefits of monitoring include:

- The quality (grade) of parts along with reliability can be easily determined and inquiries should be made on whether the parts meet allocated and derived requirements.
- Confidence in the parts that are used in DoD systems. The program office may have the ability to discuss and potentially influence the contractor's processes. The program office will also be able to maintain a degree of awareness over what the contractor is doing.
- Identification of a contractor-chosen parts from a preferred parts list (PPL) not preferable to the program office.[43] The previous section pointed out that contractors will generally select parts from their PPL. Because the contractor-chosen PPL is created to reflect the contractor's supplier relationships, price, and previous part experience, a contractor-chosen PPL part selection may not necessarily be the best choice from a government perspective. For example, the military's operating environments may be different than the contractor's experience or there may be a better part being sold by a competitor to the selecting contractor.
- Negotiated part changes before design lock. Monitoring enables potential part selection problems early, which creates an opportunity to make changes that will not impact cost or schedule.
- Enhanced program office influence. Making changes during a formal parts approval process may be difficult because of impacts on redesign cost and schedule. The likelihood of those changes occurring early in the process is significantly higher even in situations where the program office does not have approval authority.
- Improved contractor parts selection. Government engineers monitoring contractor part selection activities may have a much broader experience base than the engineers in a contractor program office. A government engineer may have had opportunities to monitor dozens of systems while a contractor engineer may only have worked on one or two systems. Therefore, the government engineer may be in a position to suggest better ways of doing things.

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[42] MDA-QS-003-PMAP-Rev C, Parts, Materials, and Processes Mission Assurance Plan, nd.

[43] Appendix C.3 describes the difference between a program office–approved and a contractor-chosen PPL.

- Improved efficiency when changes cannot be negotiated. Monitoring prepares the program office to program/budget for future mitigation costs. At a minimum, there will be improved efficiency and planning, and funding will be in place to resolve issues. While there is no guarantee that resolution costs will be lower, the improved efficiency is likely to result in a better use of personnel resources and avoid cost increases.
- Improved parts approval process. Knowing about issues in advance will improve the efficiency of the parts approval process. Review time will be reduced. A determination of possible alternatives may have occurred.
- Discovery of problematic parts. Some issues may escape notice in a parts approval process but can be detected when the program office is closely observing the selection process. The selection of known problematic parts can be identified.

Monitoring may be carried out remotely through conscientious review of BOMs throughout various stages of development. However, monitoring is more effective when the program office is also present at contractor and subcontractor facilities to observe the processes that were used to select parts for the BOMs.[44] AS9100[45] may be an effective mechanism to enable site visits to lower level suppliers. Monitoring of BOMs is affected by the risk determination and aggregation. Focus may be placed on BOMs and parts within the BOMs having the greater level of risk. However, monitoring is so important to oversight that no BOMs should be ignored. The program office should not wait until a BOM is nearly complete to monitor parts selection, as changes may be more difficult.

3.3.2 Verification

When it is determined that verification of the contractor following the processes in its Plan is a cost-effective element of oversight, then it is best to conduct some of that verification at the contractor facilities. While verification may uncover problems with contractor processes, especially contractor parts approval processes, these contractor problems could also become apparent in a program office parts approval process. The advantage of including verification in oversight is that risks may be discovered earlier and rectified before they actually impact part selection. While there are different levels of verification rigor, the simplest level is to make verification a formal extension of program office monitoring.

3.3.3 Part Approval

This guidance does not suggest a return to the pre-acquisition reform parts control environment that imposed cost and schedule burdens on the government, and schedule burdens on the contractor while waiting for program office approval. Adjustments should be made on both where part approval should be applied and how part approval should be conducted, including timelines.

There are two approaches to part approval (which will be elaborated in Section 5). First is through exception reporting, which shows parts not meeting program office preferences[46] and the second is either formal or informal processes for a government body to make an approval decision.

The concept of program office part approval under certain circumstances is consistent with MIL-STD-11991 requirements for government approval. The risk aggregation provides the program office with information on where part approval should be focused based on whatever is necessary to reduce risk to

[44] Monitoring processes may not be the sole purpose of the facility visit, monitoring can take place in conjunction with other activities to minimize any disruptions created by a government visit itself.

[45] SAE AS9100: Quality Management Systems—Requirements for Aviation, Space, and Defense Organizations.

[46] SD-26 illustrative contract requirements indicate that the program office has 30 days to reject parts included in the exception report.

an acceptable level. A program office should make a risk-based, subjective judgement on the extent to which part approval applies to the different aggregations of part selection.

Recognize however, that part approval should lead to lower life-cycle cost for the government. If a part on a military system does not meet its requirements, the situation is usually rectified. Options for fixing the problem range from finding a substitute part to redesign. Some of these options may have high cost; all of these options are costlier than selecting the right part during initial design. Therefore, it is cost effective to allocate resources for front-end oversight to avoid expenses associated with solving a problem that could have been avoided. While other forms of oversight will identify some problems, a part approval process will discover issues that other oversight mechanisms miss.

The following lists some further considerations on the extent of part approval.

- Certain program offices have decided on and implemented disciplined parts approval processes and procedures along with associated contract language based on the specific applications and missions of their systems. These program offices should continue to follow their established practices. This guidance should not be construed as a way to reduce the oversight being provided today.
- In general, part approval may be limited to those risk-based subsystem aggregations with the highest risk or some subset thereof as determined by program office experts.
- The use of exception reporting may be a way to focus part approval to the most important issues. Exception reporting also provides the program office with valuable information about the parts in systems that can be used in formulating future policy and guidance and for improving efficiency and effectiveness.
- The actual combination of part approval actions should be determined by the program office based on its determination of acceptable residual risk and the cost to mitigate risk to that level.
- Part approval may be limited to critical parts potentially based on risk tolerance for critical missions.
- Part approval should focus on the selection of standard parts as compared to non-standard parts. Standard parts meet minimum levels of quality and reliability as established in a reference Military Specifications (MIL-SPECs). Parts covered by MIL-SPECs typically meet quality and reliability needs for most military applications.
- Part approval should focus on the process for the selection of COTS assemblies. COTS assemblies are frequently utilized because they can improve cost and schedule. Unfortunately, the parts management community (industry and government) does not use standard procedures to select COTS electronic assemblies for integration into aerospace, defense, high performance, and space applications primarily because of the difficulty in obtaining BOM data on COTS assemblies.

3.3.4 Record Keeping

Maintaining and analyzing records on part selection oversight is key to improving efficiency and effectiveness. Section 6 suggests potential data elements and how they might be used to benefit the program office and higher levels of management. The program office should decide what is appropriate but the sooner records are maintained, the sooner concrete examples of the value of collecting and using parts management records can be documented and best practices can be established.

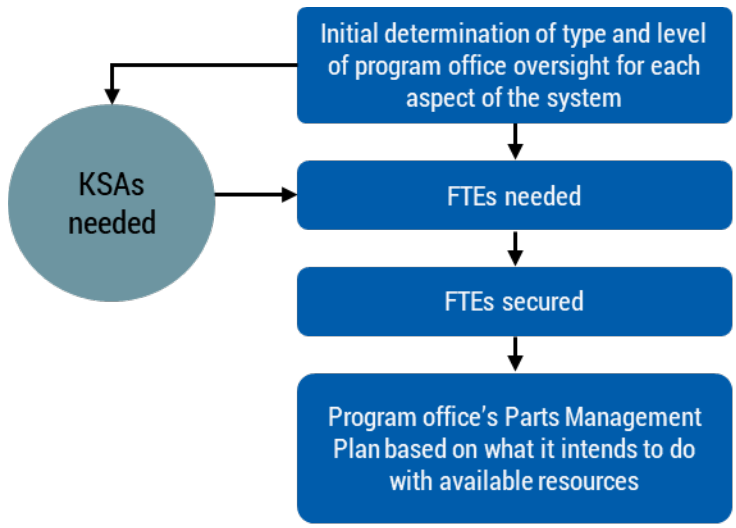
Section 4. Engaging Subject Matter Experts

The risk assessment enables a program office to determine the government oversight activities necessary to reduce parts selection risks to an acceptable level for the system. The third element of a program office Parts Management Program is to identify and secure access to the subject matter expertise sufficient to conduct the program office's oversight activities.

To do this, program offices should:

- Specify the knowledge, skills, and abilities (KSAs) needed,
- Determine the associated level of effort, and
- Secure access to the personnel who will provide the needed level of effort by KSA.

The overarching process is pictured in Figure 3 which is a continuation of Figure 2.



Note: FTE = full-time equivalent.

Figure 3. Securing Personnel Resources to Support Type and Level of Oversight

The following three subsections discuss each of the above bullets.

4.1 Specifying the Knowledge, Skills, and Abilities Needed

Traditionally, parts management KSAs have focused on the multiple disciplines of engineering. The following list is representative of potential, traditional KSAs for overseeing contractor parts selection and approval.

- Knowledge of mechanical, electrical, and chemical engineering
  - Abilities in circuit, structural, thermal, and stress/strength analysis
  - Abilities in corrosion and degradation analysis
- Knowledge of material properties, including surface properties
  - Abilities in construction and physical analysis
- Knowledge of material characterization techniques

- Knowledge of part construction and manufacturing processes[47]
- Knowledge of assembly processes
- Knowledge of welding, soldering, brazing, mechanical joining, and adhesive joining
- Knowledge of additive manufacturing
- Knowledge of part manufacturer business practices and critical customers
- Knowledge of reliability, quality, and design engineering
  - Skill in fault tree, failure, and root cause analysis
  - Skill in statistics and failure distributions
- Knowledge of historical failure mechanisms
- Knowledge of accelerated testing techniques
- Knowledge of inherent design problems that prevent parts from meeting allocated and derived requirements.

Such traditional KSAs are necessary but not sufficient in today's part selection environment. Supply chain issues, highlighted by the pandemic, and the risks associated with system compromise by adversaries, have demonstrated the need for additional KSAs associated with system security engineering and SCRM.

- Knowledge of SCRM
  - Ability to analyze suppliers' capacity to meet demand based on broad economic conditions and supplier financials
  - Ability to analyze suppliers' capacity to meet demand based on capacity, infrastructure, human capital, and transportation/distribution limitations
  - Ability to analyze suppliers' capacity to meet demand based on political and regulatory, environmental, and other compliance factors
  - Ability to analyze DoD wholesale suppliers' capability to keep stock on hand, based on factors such as commonality of parts with other DoD systems, expected demand rates, and costs
  - Ability to assess risks associated with FOCI
  - Ability to assess risks associated with counterfeit and malicious tampering
- Knowledge of system security engineering
- Knowledge of critical hardware/software vulnerabilities
- Knowledge of cyber-attack opportunities and mitigation of risk
- Knowledge of techniques to secure networks and systems
- Knowledge of program protection planning and CPI
- Knowledge of criteria for achieving desired levels of hardware and software assurance.

The risk assessment may not specifically highlight all the exact skills needed. Some KSAs may be a very small part of the government's oversight and approval function. Therefore, most program offices should obtain access to key personnel possessing skills and experience representative of the comprehensive list of KSAs on an as needed basis. Because few individuals have the broad levels of experience necessary to encompass all or even a majority of this long list of KSAs, access to such a set of KSAs will normally be obtained from a wide variety of people, not a small set of experts.

[47] Usually developed one part commodity at a time to build knowledge base.

4.2 Determining the Necessary Level of Effort

There may not be a formal way to calculate a level of effort required as a function of the risk assessment. Program offices may ultimately rely on the judgement of experienced government SMEs in combination with a workload analysis tool. Highly critical missile defense program offices with intense parts management oversight suggest 4 FTEs. Some Acquisition Category (ACAT) I aviation and missile program offices with rigorous parts management oversight use 1–3 FTEs.

The level of effort should be a function of:

- Oversight activities,
- Number of (critical) parts in the system, and
- Life cycle stage of the system.

If the risk assessment concluded that only program office approval of a contractor Parts Management Plan[48] is a sufficient level of oversight, then a minimum of ~0.25 FTE may be adequate. If additional oversight is needed to address risk (e.g., part approval, monitoring contractor part selection activities, …), then the level of oversight effort will vary as a function of the number of (critical) parts. During design and development, the minimum level of effort should be 1 FTE for ACAT I program offices. For other ACAT levels, a single FTE could be shared among several program offices. Generally, a lower level of support is needed during production and sustainment because part selection activities will be much lower. The final determination of parts management staffing levels should be reflected in the program office's technical staffing plan included in the SEP.[49]

4.3 Securing Access to the Necessary Level of Effort

The KSAs may be provided by a combination of government and contractor personnel. In practice, however, contractors will often be responsible for providing the majority of the KSAs. Some of the KSAs may not be common in the government, and if found in government, such personnel may not be available when needed because they are in high demand.

Usually, program offices have Systems Engineering and Technical Assistance (SETA) contracts to provide on-call subject matter expertise for many of the various KSAs needed to support parts management. Therefore, program offices should define the statement of work/capabilities for those SETA contracts to include the necessary level of effort and response time for the parts management KSAs. Associated risk increases should be documented in the program office Parts Management Plan.

[48] A thorough contractor Parts Management Plan should take about 1–3 person weeks to review.

[49] Office of the Deputy Director for Engineering, *Department of Defense Systems Engineering Plan Outline*, Version 4.0, September 2021.

Section 5. A Program Office Parts Management Plan

Section 3 of this document identified risk-based considerations for program office decisions on parts selection oversight. Section 4 took into account the availability of the necessary subject matter expertise to make adjustments to the oversight to be performed. This section, along with Section 6 on record keeping, discusses how to document those oversight activities in a program office Parts Management Plan and provides guidance on how to perform that oversight.

Formulation of the program office Plan to oversee contractor parts selection activities should begin early in a system's life cycle. Such a Plan should be developed for *every company*[50] that is involved in design activity; parts selection, replacement, or substitution; or the use of prototypes, NDI, or GFP. The emphasis on establishing a program office Parts Management Plan for every company is crucial, because parts management oversight of a contractor's parts selection efforts is dependent on the contracted functions that the contractor performs on the system. For example, oversight of design is different than oversight of a maintenance. The Plan should be updated as appropriate whenever there is a contract modification or the exercise of a contract option with that company.

There also are non-contractual reasons for updating the program office Plan. For example, system requirements or missions or operating environment may change, and such changes will impact the risk assessment that determined the appropriate level of program office oversight. Therefore, the program office Plan should be a "living document" that is relatively easy to modify.

The program manager, chief engineer, or quality lead should approve a program office Parts Management Plan that documents all of the program office's parts management oversight activities. A program office's Parts Management Plan should be discussed and referenced in the technical tracking sections of the SEP. The SEP outline calls for documentation of how the program office implements various aspects of systems engineering which encompasses parts selection considerations (e.g., system security engineering, reliability and maintainability, …). Implementation includes contract requirements and program office oversight of how the contractor satisfies those requirements per the program office's Parts Management Plan.

A program office's Plan should include what it specifically intends to do based on resources available and why; it should not be a tutorial on best parts management processes. References to other applicable documents should be made as much as possible to avoid duplication. The program office should provide a copy of its Parts Management Plan to the contractor to help guide part selection activities and better align them with the program office's requirements and expectations. If the program office's Plan contains information inappropriate for sharing, the program office should redact such material.

The preferred organization and content[51] for a program office Parts Management Plan is:

1. Introduction and summary
   - 1.1 Scope and applicability
   - 1.2 Risk assessment and level and type of oversight
   - 1.3 Resources

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[50] Although a discussion of these subjects is deferred until a future version of this document, the Plan is also applicable when any of these activities are performed organically.

[51] Data rights should be discussed in the Intellectual Property Strategy.

2. Review and approval of a contractor Parts Management Plan
    2.1 Contractor Parts Management Plan requirements
    2.2 Government review and approval of processes documented in the contractor Plan
3. Verification of whether the contractor is following the processes in its Plan
4. Validation of contractor's part selections
    4.1 Government monitoring of contractor part selections
    4.2 Assessing the viability of parts selected that do not meet government preferences
    4.3 Government approval of parts
5. Record keeping and metrics
6. Review and approval of part selections by other government organizations
7. Continuous monitoring of part selections.

The remainder of Section 5 provides further guidance about how to perform oversight and what should be included in a program office Parts Management Plan. It is organized by the sections in the Plan outline as follows:

- Section 5.1 describes the introduction and summary;
- Section 5.2 discusses the review and approval of a contractor Parts Management Plan;
- Section 5.3 covers verification of whether the contractor is following the processes in its Plan;
- Section 5.4 explains validation of contractor's part selections;
- Section 5.5 refers to the discussion of record keeping and metrics found in Section 6;
- Section 5.6 draws parallels to Sections 5.2 through 5.4 for government part selection; and
- Section 5.7 provides information on the monitoring and assessment of supply chain changes along with the need to change parts as a function of risk.

5.1 Introduction and Summary

5.1.1 Scope and Applicability

The scope and applicability section of the program Parts Management Plan should answer the following questions:

- What are the program office's near term and long term objectives associated with its Parts Management Plan?
  The overall objective of a program office Parts Management Program is to ensure that the parts selected for the applicable systems meet their allocated and derived requirements to include performance, quality, security, supply chain risk, etc. However, in most cases, a program office's long-term objective of its Plan is to establish the government's parts management activities associated with oversight of contracts to manage system security, part availability, and part performance risks (as discussed in Section 2). In the short term, however, depending where the system is in its life cycle, a program office may have one of multiple, possible objectives. For example, one option may be ensuring the adequacy of the processes in the contractor Parts Management Plan and ensuring that the contractor is following those processes. Another example is deciding the timeline for part acceptance (to be defined by the program office, e.g., within five days) a contractor's approval submission.
- On what system(s) is parts management oversight being conducted?
  This question identifies the weapon system(s) covered by the program office Parts Management Plan. While development and production contracts are usually associated with a single weapon system, support contracts may not be. If there will be no parts management activity on any of the systems under the purview of the program office, indicate which

systems are excluded and the rationale for exclusion. Parts management activities on test and support equipment should be encompassed in the parts management activities of the system(s) they support when included in the contract.[52]

- What is the contractor scope of work?
  Indicate whether the contractor is performing development, production, maintenance, modification, or some combination thereof and describe the extent of part selection activities taking place for each of those functions. For example, maintenance may not involve a great deal of parts selection if common multiple-source parts are the only ones being consumed. On the other hand, development could involve significant parts selection.

5.1.2 Risk Assessment and Level and Type of Oversight

This section summarizes a program office's oversight decisions based on the results of the government risk assessment and the determination of the type and level of oversight that will be conducted as described in Section 2 of this document. The program office Plan should state whether a contractor Parts Management Plan is required. When not required, an explanation of the exclusion rationale should be provided. If the contractor Parts Management Plan is required, the program office Plan should discuss if there will be verification of whether the contractor is following the processes in its Plan and how such oversight will be conducted and the associated rationale.

The program office Parts Management Plan should also list the aspects of the system (subsystems) where the program office will apply additional parts selection oversight along with the rationale for focusing on those aspects of the system. This may be for all parts, only critical parts, parts associated with PPP identified subsystems, subsystems with similar likelihood and severity of risk, or something else depending on the nature of the risk assessment.

Finally, the program office's Parts Management Plan should briefly[53] identify the validation activities it will perform for each of those system aspects, as well as the rationale for performing those validation activities. Such validation oversight activities include:

- Monitoring of contractor's part selections;
- Assessing the viability of parts selected that do not meet government preferences; and
- Government approval of parts.

Finally, the program office Plan should also indicate the total FTEs needed and available. The program office Plan should be executable within available resources. If the available FTEs are less than what was needed, the Plan should highlight the changes made to accommodate the shortfall.

5.1.3 Resources

The resources section of the program office Parts Management Plan should identify the people involved in parts management oversight. In general, there will be two sets of skills involved—the general parts management skills necessary to perform oversight functions and detailed subject matter expertise needed under specific, technical circumstances.[54]

While it is not unusual for SMEs to be located in multiple program office organizations (or even external to the program office, since their expertise will not be needed all the time), the program office may choose whether to centralize general parts management oversight. A decentralized organization could place the

[52] A contract associated with a single system and its test and support equipment, would identify only that single system regardless of whether the support equipment is applicable to other systems. A contract only associated with test and support equipment for multiple systems should identify the test and support equipment itself as the system involved.

[53] The details of this subject matter should be included in later sections of the program office Plan.

[54] A single individual may provide both types of skills.

parts management practitioners in various subsystem-related Integrated Product Teams (IPTs) based on how the program office is organized.

Program office leadership should appoint a single, overall parts management lead[55] early in the design process. This parts management lead should coordinate the objectives of the parts management program, organization of the parts management team, roles and responsibilities of the parts management team, and relationship with other organizations in the program office and contractors.

The resources section of the program office Parts Management Plan should identify parts management practitioners needed to perform oversight, their roles and responsibilities, their areas of expertise, and the (program office or other) organization where they are assigned. For example, a matrix as shown below may be provided (Table 2).

Table 2. Example Matrix

Name	Roles and responsibilities	Areas of expertise	Organization
xxxx	Parts management lead		

The Plan should also show the interactions needed for parts management practitioners to be able to perform their functions effectively. For example, the Plan could list the other communities/teams in the government and at the contractor with whom parts management practitioners should network (e.g., SCRM, design, system security engineering, cyber) and then describe the purpose and frequency of that networking.

5.2 Review and Approval of a Contractor Parts Management Plan

5.2.1 Information on Associated Contractual Requirements

The SD-26 illustrative requirements applicable to this section of the program office Plan are concerned with whether a contractor Plan should be required, and if required, whether the contractor Plan should be based on only the general requirements of MIL-STD-11991 or both the general and detailed requirements of MIL-STD-11991.[56] These subjects, along with any further tailoring of the MIL-STD-11991 requirements, were discussed in Section 2.2.2.

[55] The parts management lead may not be a full-time function.

[56] See SD-26 illustrative requirements 24, 25a, and 25b.

SD-26 Description

The SD-26 is primarily composed of a series of tables and appendixes that provide illustrative language for DMSMS and parts management contract requirements along with implementation notes about their applicability as a function of different life-cycle circumstances. The illustrative contract requirement wording should be tailored to complement the program office's Acquisition Strategy and its corresponding product support concepts, competition strategy, and intellectual property strategy. Not every requirement is applicable in all circumstances. Inclusion of any of the referenced contract requirements should be based on assessments of the specific risk to the program office and the availability of suitable, government subject matter expertise to review contract proposals and contractor submitted deliverables to ensure they meet the government's requirements. Other material in the SD-26 includes:

- Other sections of a contract where parts and DMSMS management concepts should be included and suggestions of what should be conveyed;
- Requirement applicability during each phase of the MCA pathway and as a function of the level of government involvement in parts and DMSMS management; and
- Associated contract data requirements lists and data item descriptions.

The SD-26 contains two other illustrative contract requirements to tailor MIL-STD-11991 that should be reflected in the contractor Parts Management Plan. One requirement is associated with manufacturing processes that should be included in the contractor Plan. The second adds additional part specification requirements or part prohibitions; additional guidance on these requirements is shown in Appendix C.

The contract should specify that the program office has the right to review and inspect material needed to review and approve the contractor Plan and documents referenced by that Plan. The material to be inspected or reviewed should be specified along with the period of performance of the contract when this review and inspection can occur.

5.2.2 Oversight Considerations

A program office should concentrate its review of the contractor Parts Management Plan on the processes associated with the principal parts management technical requirement areas of highest concern. At a high level, the program office review of the contractor's Plan should ensure that the Plan addresses the general requirements in MIL-STD-11991, informed by detailed requirements where applicable and managing risks for areas such as obsolescence, counterfeits, lead-free electronics, plastic encapsulated microcircuits, and additive manufacturing in part through the submission of BOMs or parts lists.

Ultimately, the contractor's Plan should provide the program office with confidence that sufficient part selection rigor will be applied. The following lists technical requirement areas that are usually among the most important regardless of whether the general requirements or all requirements of MIL-STD-11991 are invoked. Government practitioners should be familiar with MIL-STD-11991 prior to reviewing the contractor Plan. The contractor Plan should:

- Define contractor-customer interfaces, such as IPTs or working groups, to address issues, review part selections, and review qualification tests by both the prime and its sub-tiers. Include configuration control and part disposition documents, focal points, change concurrence processes, and process verification.
- Describe how part application requirements are derived from system requirements and detailed part and vendor selection processes that consider life-cycle cost, supportability, and availability. (See MIL-STD-11991 sections 4.2 and 4.2.1.)
- Identify restricted or prohibited parts based in part on lessons learned and controlled part categories; review any proposed use with customer where applicable. (See MIL-STD-11991 section 4.3.11 and Appendix C.)

- Explain how parts qualification processes will assure meeting application requirements (e.g., baselining requirements using industry and military standards as a starting point). Identify part qualification methodologies and test assets along with vendor qualification processes. Provide an order of precedence that favors the selection of standard parts. (See MIL-STD-11991 sections 4.3.4 and 4.3.5.)
- Incorporate suitable industry standard processes with suitable performance levels defined, such as definition of any part grades, classes, reliability levels assumed to meet application requirements (e.g., Class 3 for Initial Production Check [IPC] J-STD-001 soldering) to assure sufficiency and provide for efficient part selection. (See MIL-STD-11991 section 4.3.3.)
- Prioritize part classes based on considerations of quality, reliability, and obsolescence timelines.
- Encourage part standardization. (See MIL-STD-11991 section 4.3.3.)

Part Standardization Benefits

- **Reduced acquisition lead-time and costs.** Government and industry avoid the expenses and delays of designing and developing parts by using common parts.
- **Delayed or mitigated DMSMS and part obsolescence.** Standardization of parts increases demand and the likelihood of sustained sources.
- **Increased reliability.** Increased item standardization leads to a more extensive performance history and user experience that can improve the likelihood of reliable equipment performance.
- **Enhanced logistics readiness and interoperability.** Common components simplify logistics support, enhance substitutability and interoperability, and translate to savings in procuring, testing, warehousing, and transporting parts.
- **Increased safety of systems and equipment.** Preferred parts reduce risk and reduce mission failure and loss of life.

- Define stress derating levels and indicate how customer communications will demonstrate how part applications are within stress limits. (See MIL-STD-11991 Appendix A.)
- Explain processes for assuring that COTS assemblies will meet application requirements and for accounting for GFP performance. (See MIL-STD-11991 section 4.5 and Appendix B.)
- Include processes to notify customers when parts not procured from authorized sources along with counterfeit mitigation efforts. (See MIL-STD-11991 section 4.4.2 and Appendix F.)
- Document processes to monitor failures to identify whether they are caused by part issues and to coordinate with customer on resolutions and corrective action when that is the case. (See MIL-STD-11991 sections 4.3.6 and 4.4.3.)
- Document effective processes to flow down requirements to subcontractors and to require separate subcontractor Plans (when the prime contractor is unable to flow down requirements, then the prime contractor is responsible). Address subcontractor data and parts lists. (See MIL-STD-11991 section 4.6.)
- Establish a configuration control process, including change notification, approval, and alternate or substitute parts and materials. Include a part documentation process. (See MIL-STD-11991 sections 4.4.5 and 4.4.9.)
- Include processes to access all necessary reference documents.
- Provide terms and definitions.

When only the general requirements of MIL-STD-11991 are invoked, there may be more cycles of review to ensure all of the requirements are documented, because of the absence of detail. A program office may create its own checklist associated with the above list of requirement areas (or modifications thereof) if determined to be useful.

There are other considerations, beyond processes for meeting parts management technical requirements, associated with reviewing and approving a contractor Parts Management Plan. The contractor Plan should

- Inform the program office of the contractor's lines of responsibility for the processes to meet the above technical requirements;
- Provide the program office with the right to review and inspect data necessary to perform the functions established in the program office Parts Management Plan (e.g., a level 3 technical data package [TDP] when reviewing part selections);
- Ensure the right to review and inspect all referenced documents;
- Require program office approval on changes to the contractor Parts Management Plan; and
- Detail the program office's process to institute part changes when the government determines that a contractor-selected part is not suitable.

The last bullet is very important. If there is a problem with a part when a product is delivered, whatever the cause, the program office normally carries all of the risk and pays for corrective action depending on the terms and conditions in the contract. The contractor Parts Management Plan can establish processes to replace parts during design. However, even later in the life cycle, when part selection occurs, the program office should seek a mechanism to reject unacceptable parts before they are installed on a system. The life-cycle cost of a system increases when corrective actions are taken after a system is fielded as compared to when the part is initially selected. Life-cycle costs also increase as a result of procuring spares to replace failed parts.

Typically, the review and approval process to meet each (or key) MIL-STD-11991 requirement should be assessed as compliant, something minor to fix, or non-compliant. If the contractor tailors a requirement, the program office judges the acceptability of that tailoring. The program office should only accept the contractor or subcontractor Parts Management Plan when the adequacy of every process necessary to meet MIL-STD-11991 general or general and detailed requirements have been determined. Work should not be allowed to start unless all processes are compliant. A thorough review of a contractor Plan usually takes two to four weeks.

As a function of risk, the program office may review and even approve subcontractor Parts Management Plans in conjunction with the prime contractor. The level of program office involvement in the review of subcontractor Plans varies—

- The program office may perform its own independent review of the Plan;[57]
- The program office may be a participant in the prime contractor review of the Plan;
- The program office may review the prime contractor's processes for reviewing the Plan;
- The program office may only review the Plan when problems arise; or
- The program office may not review the Plan.

For the fourth bullet, if a problem arises, the program office should learn about it as a result of its participation in technical, production, or other reviews.[58] When that occurs, the program office may review subcontractor Parts Management Plans to determine the cause of the problem (e.g., the prime contractor may not have established the right requirements for the subcontractor) and to help formulate mitigations.

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[57] This is a common practice for MDA for important subsystems.

[58] Periodic auditing of subcontractors is a more rigorous way to determine whether there are potential issues with subcontractors as compared to total reliance on scheduled reviews. Such audits may be unannounced.

5.2.3 Associated Program Office Parts Management Plan Content

When a contractor Plan is required, the program office Plan should describe how to examine the contractor Parts Management Plan and subcontractor Parts Management Plans if applicable.[59] The program office Plan should also discuss review and approval procedures. Review procedures should include a list of reviewers and the elements of the contractor Plan where each reviewer will focus his or her efforts.

Finally, the program office Parts Management Plan should state whether oversight will be limited to review and approval of the contractor or subcontractor Plan.

When no contractor Plan is required, the program office Plan should briefly add to the material summarized in the Risk Management section by discussing the risks incurred from excluding a contractor Plan and why those risks are acceptable.

5.3 Verification of Whether Contractor is Following the Processes in its Plan

5.3.1 Information on Associated Contractual Requirements

Most verification activities are not contractual because verification is a government process. The SD-26 illustrative requirement in this area (illustrative requirement 28) is concerned with the availability of documents and data on the processes in the contractor Plan.

There is another contractual possibility not explicit in the SD-26, a related DMSMS management illustrative contract requirement. SD-26 illustrative requirement 15 entitled “monitor, manage, and report subcontractor DMSMS capability” could be tailored for verifying subcontractors are following the processes in their Parts Management Plans. It is also possible for the program office to team with its prime contractor in these verification activities.

5.3.2 Oversight Considerations

A good parts management oversight practice is to verify that the contractor is following the processes in its Parts Management Plan.

When verification will be conducted, any combination of five approaches may be followed. All these approaches include program office (or program office representative) presence at contractor facilities. While process documentation can be reviewed remotely, independent quality assurance requires on-site presence.

- ***Official program office audit.*** In the planning stage of this approach, the program office establishes criteria to verify whether the contractor follows the processes in its Plan. Next, program office SMEs perform official site visits to observe and inspect the contractor’s processes. Site visits form the basis for an evaluation of whether the criteria are being met. The results of the evaluation become the documented findings.
- ***Address parts management during formal program office reviews.*** Such reviews are routinely performed, they are often called product assurance, management, or quality reviews. The scope of these reviews extends beyond parts selection processes and decisions, all technical risks (e.g., obsolescence, performance, schedule, cost) are included.
- ***Request Defense Contract Management Agency (DCMA) surveillance.*** DCMA surveillance is intended to verify that companies are fulfilling the provisions of their contracts

[59] Part of the review should be at the contractor’s facility.

with the DoD. Surveillance encompasses substantiation of costs, confirmation of product performance and service delivery, inspection of processes and procedures (such as testing and qualification), and other contracted activities.[60] When DCMA is the administrative contract officer, it may perform parts management surveillance in cases where risks associated with part selection processes are deemed to be high and surveillance personnel/ resources are available. If a program office wanted to ensure that parts management surveillance occurs, it would likely prepare a Quality Assurance Letter of Instruction, a memorandum of agreement, and/or a memorandum of understanding that specifically requests DCMA to perform those functions. The request would also provide instructions on how and how often DCMA should perform those functions. Depending on the level of technical sophistication required, supplemental program office expertise may be essential, thereby making this approach very similar to the official program office audit.

- ***Embed engineers with the contractor.*** A program office may embed engineers (either full time or part time) at a contractor location. Usually this is done for technically demanding or especially critical/sensitive applications to ensure quality, to determine that all requirements have been met, and to observe testing. These engineers could also verify that the processes in the contractor Parts Management Plan are being followed and periodically report their observations to the program office.
- ***Informal site visits and other interactions.*** This is the least formal verification approach. Day-to-day interactions between the contractor and the program office can be leveraged to form an opinion about the extent to which the contractor is following the process in its Parts Management Plan. Interactions can take multiple forms. They may be system and/or subsystem IPT meetings or there could even be parts management working group meetings where parts approval is discussed and questionable part selection decisions (e.g., a microelectronics part greater than seven years old) can be identified and resolved.

The following lists important part selection practices that should be followed by the contractor and verified by the program office.

- Document and understand the performance requirements, including functions, reliability, quality, cost, life-cycle cost, life-cycle stresses (higher level manufacturing processes, environmental, operating, time, corrosion/degradation, etc.).
- Document prohibited parts, materials, and processes; required performance requirements (such as military or automotive specifications); country of origin limitations; and similar criteria.
- Identify suitable specifications for defining part capability requirements.
- Identify manufacturers with suitable product assurance programs and parts that meet suitable specifications.[61]
- Identify parts with maximum stress ratings that will meet program and/or application stress derating requirements.[62]
- Identify parts with suitable functional and tolerance requirements for the application (including assessment with circuit tolerance analysis for electronics).
- Document part manufacturer's qualification, quality, and reliability data that meets the application requirements and/or identify data gaps that may require additional testing or mitigation.
- Document the part construction (parts, materials, and processes) to confirm suitable product assurance (e.g., qualification tests suitable for the construction).
- Document stress derating for each application instance.

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[60] Paraphrased from DCMA Manual 2303-01, *Surveillance*, May 17, 2020.

[61] Most military applications will require parts that meet military, aerospace, or automotive specifications.

[62] MIL-STD-11991 defines stress derating levels suitable for most military applications.

- Document manufacturing and test supply chain.
- Evaluate and document obsolescence and availability risks and mitigations.
- Evaluate compatibility with higher level manufacturing processes and materials (e.g., solder and curing processes, assembly stress screening).
- Evaluate compatibility with assembly parts and materials (e.g., galvanic couples, outgassing effects).

Verification applies throughout the supply chain especially when the prime contractor is the system integrator because that implies significant part selection occurs at sub-tier vendors. Verification performed by the program office, and documented in its Plan, should encompass both parts and COTS assemblies and include

- A determination that parts management requirements are being flowed down to the sub-tier vendors correctly
- An evaluation of the sub-tier vendors to ensure they are following the processes established in their Parts Management Plans.

Any of the five above verification approaches should include a flow down of requirements into the sub-tiers. If a program office wants DCMA parts management surveillance to extend to lower tiers of the supply chain, letters of delegation could be required. Because of the complexities and costs of such sub-tier surveillance, it is not generally pursued. Rather, the prime contractor's processes for ensuring sub-tier parts management compliance would be reviewed.

The program office may repeat some of these verification approaches. While the use of embedded engineers and informal interactions are continuous activities, the others are not. A program office audit, program office technical reviews, DCMA surveillance, and evaluations of sub-tier vendors may be repeated periodically or at certain key points in the system's life cycle as a function of risk and past performance.

Verifying whether a contractor is following the processes in its Parts Management Plan is important. Not following the agreed upon processes identifies the need for corrective action. However, verifying that a prime contractor *is* following the processes in its Plan may not reduce risk sufficiently depending upon the contractor's functions. For example, the prime contractor part selection may be minimal—all part selection may occur at lower tiers of the supply chain. In that case, the only prime contractor processes to be verified are flow down of parts management requirements, approval of the subcontractor Parts Management Plan, and oversight of lower tier part selection. This may not serve as an effective validation of part selection for the system.

5.3.3 Associated Program Office Parts Management Plan Content

This section of the program office Parts Management Plan discusses if and how this function is included in program office oversight. When verification is excluded, the program office Plan should explain why the risks were acceptable.

5.4 Validation of Contractor's Part Selections

Including the validation of the contractor's part selections in the program office Parts Management Plan could be an important aspect of its oversight to reduce part selection risk. This section of the program office Parts Management Plan therefore discusses oversight activities associated with its parts management practitioners obtaining data on the parts selected and then determining and acting on part acceptability for some or all parts. Potential actions include approving or rejecting some or all parts or only suggesting part changes to the contractor. Specific validation approaches are discussed in the next three subsections.

- Program office monitoring of contractor part selections to facilitate suggested part changes or processes for part rejection or part approval
- Assessing the viability of parts selected that do not meet program office preferences leading to part rejection, suggested part changes, or expedited part approval processes
- Specific program office approval or rejection of parts.

5.4.1 Program Office Monitoring of Contractor Part Selections

5.4.1.1 Information on Associated Contractual Requirements

There are no explicit contract requirements associated with this aspect of the program office Parts Management Plan other than the ability of the program office to review and inspect material needed to conduct monitoring. The material to be inspected or reviewed should be specified along with the period of performance of the contract when this review and inspection can occur.

5.4.1.2 Oversight Considerations

A combination of two monitoring methods should be used to examine part selection with the prime contractor and in the sub-tiers. In the first method, the program office interacts with the contractor during design and part selection. Contractor processes are observed directly, discussions are held, and the preliminary outputs of those processes can be reviewed before being finalized. This approach gives the government the earliest possible insight into the parts selection processes and preliminary decisions. The second method involves reviewing preliminary parts lists/BOMs and their updates. Such parts list reviews would be slightly later than the interactions in the first method, but still relatively early in the parts selection process.

The purpose of the reviews is to decide whether the selection is acceptable to the program office. The SD-18, *Part Requirement & Application Guide*[63] may have helpful background information to support that determination; however, the SD-18 should not be the sole basis for decision-making because it is a legacy document that is not updated.

In either monitoring method, the reviews would take all the part selection considerations into account. Fundamentally there would be a determination of whether the parts meet all their requirements. For example:

- Have the proper grade parts been selected? Is there an overuse of commercial grade parts? Should more military grade parts be used?
- Have prohibited parts been selected?
- Have all applications and operating environments been considered?
- Is reliability sufficient?
- Is the part shelf life adequate? Is the part nearing the end of its life cycle?
- Have cybersecurity vulnerabilities been mitigated?
- Are there opportunities for tampering or counterfeiting in the supply chain? Are lower tier vendors secure? Are there any unauthorized sources?

The reviews should take a slightly different form for COTS assembles. Because there are no standard procedures used by the parts management community (both industry and government) to select COTS

[63] SD-18, *Part Requirement & Application Guide*, DSPO, nd. https://www.navsea.navy.mil/Home/WarfareCenters/NSWCCrane/Resources/SD18.aspx.

assemblies, a government-industry team, sponsored by DoD's DMSMS and Parts Management Working Groups (WGs), examined the problems associated with choosing and using COTS assemblies throughout a system's life cycle. The team developed a COTS assembly checklist[64] to help establish a structured and sound evaluation environment for program office personnel to compare various electronic COTS assemblies for use in safety critical or mission critical aerospace, defense, high performance, and space applications. The questions found in the checklist provide a communications mechanism (from industry to program office) for monitoring and assessing COTS assembly selections. Program offices should encourage industry to use the checklist for selecting COTS assemblies.

A parts list or BOM review is not a one-time event. PCNs issued by the Government-Industry Data Exchange Program (GIDEP) and other sources should be monitored. When a change occurs, a part that had been determined to be acceptable may be altered in a way that is no longer acceptable.

When any parts selection problems are found, the program office should seek a way to negotiate their correction. The program office should exert as much influence as possible to make part changes because ultimately, the problem will have to be fixed. Fixing a design issue before fielding is highly preferable.

5.4.1.3 Associated Program Office Parts Management Plan Content

This section of the program office Plan is similar to the verification section. The Plan should discuss whether there will be monitoring and include a risk-based explanation of why monitoring was excluded if that is the case. When monitoring is included, the program office Plan should describe the monitoring activities to be performed and how they will be carried out.

5.4.2 Assessing the Viability of Parts Selected that Do Not Meet Program Office Preferences

5.4.2.1 Information on Associated Contractual Requirements

There may be instances where the program office indicates a preference for some specific part characteristics (e.g., sole source) but does not state that preference as a requirement because it may not be possible to achieve everywhere, or it may be too expensive to apply everywhere. In such instances, the program office could require the contractor to submit "exception reports" describing where the characteristic was not met and why.

These requirements inform the contractor of government interests so the contractor is better able to satisfy its government customer beyond meeting program office requirements. For example, the contractor may select a part that is different from the one it would normally select in similar circumstances. Similarly, the contractor may attempt to obtain some data on a part characteristic or lower tier supply chain company that it typically would not consider.

The SD-26 illustrative language includes requirements[65] for exception reports for parts not meeting the following explicit preferences:

- Microelectronics parts procured from an authorized source
- Microelectronics parts meeting the criteria of International Organization for Standardization/ International Electrotechnical Commission (IEC) 20243-1:2018
- Avoiding rebranded parts

[64] *Commercial Off-the-Shelf Critical Electronic Assembly Selection Checklist: Guidance and Background Information*, Revision 1.1, DSPO, October 27, 2021.

[65] See SD-26 illustrative requirements 30, 31, and 32.

- Microelectronic parts with at least one qualified and approved alternate
- Parts meeting program protection and hardware and software assurance requirements.

Other exceptions may be used at the discretion of the program office. The contract should specify that the program office has the right to review and inspect material needed to review and understand the content of the exception along with the period of performance of the contract when this review and inspection can occur.

5.4.2.2 Oversight Considerations

These exception reports should include:

- A list of selected parts where the contractor did not meet the program manager's preference.
- A description of why the part was chosen.
- An explanation of the risk mitigations put into place to address the risks associated with not meeting the preferences.

When exception reports are required, the contractor should also be required to allow the program office to view and inspect data, information, and reports (including test reports) that support the mitigations shown in the exception reports.

Exception reports and their supporting data should be used to

- Enable the program office to reject parts that do not meet its preferences. The SD-26 illustrative contract requirement gives the program office 30 days from receipt of the exception report to reject the part. The reason for the 30-day time frame is that the program office does not want to put itself on the critical path of system development for a long period of time. After 30 days, the program office may coordinate with the contractor about further use of the parts according to the SD-26. Parts are automatically accepted if the program office does not respond to the exception report.
- Highlight areas where program office attention may be needed in the context of its monitoring of the contractor's parts selection processes and its parts approval process.

5.4.2.3 Associated Program Office Parts Management Plan Content

The program office Parts Management Plan should include a breakdown by the risk-differentiated (and therefore oversight differentiated) subsystem aggregations, as appropriate, of the following:

- The program office preferences to be put on contract.
- How the preferences are expressed for exception reporting. This may include a measure of criticality.
- Information to be reviewed that supports a decision to reject the part, coordinate with the contractor about further use of the parts listed in the exception report after *30* days, or to take no action which is equivalent to approving the use of the part.
- A description of the process for rejecting parts.
- A description of the process for coordinating further use of the parts and a plan for phasing out part usage.

5.4.3 *Program Office Approval of Parts*

5.4.3.1 Information on Associated Contractual Requirements

The illustrative language in the SD-26 (see illustrative requirement 32) requires program office parts approval in the following circumstances:

- Part use outside vendor specifications other than in accordance with the criteria in Appendix A of MIL-STD-11991.
- Use of any prohibited parts, materials, and processes from MIL-STD-11991, Appendix C.
- Use of any non-conforming parts without government approval.
- Use of application specific integrated circuits system not procured from a Defense Microelectronics Activity accredited trusted supplier in accordance with DoDI 5200.44.[66]

The contract should specify that the program office has the right to review and inspect material needed to approve parts. The material to be inspected or reviewed should be specified along with the period of performance of the contract when this review and inspection can occur.

5.4.3.2 Oversight Considerations

As a function of the risk assessment, program offices' parts approval needs may vary. Some program offices may have no need to approve any parts, while other program offices may need to approve all parts or only all critical parts for the entire system or for some selected subsystems. For example, in fixed price contracts where the contractor is responsible for performance, program office part approval may be limited. The concept of risk tolerance may also apply. The amount of part approval should be a function of the mission and a determination of the extent of risk acceptability. Program office part approval should be based on an analysis of contractor provided data that will provide government SMEs with a basis to accept or reject any given part. Data needs may also vary as a function of risk tolerance. Part approval should be somewhat automatic when there is a program office–approved PPL. Parts on this PPL have been pre-approved for use.

Parts approval may be formal or informal during design. Both the formal and informal processes may be program office or contractor led. When the contractor leads, it is only necessary for the program office to participate with de facto authority to reject any part it considers unacceptable.

- A formal process might have an official parts control board or a configuration management board that approves parts. The contractor may be required to formally submit parts for approval along with data for the board to consider when making a formal decision. Potential data requirements[67] for non-standard parts include part information (e.g., manufacturer, vendor, part number), prohibitions or restrictions on the use of the part, mitigations performed to mitigate restrictions, information from a destructive physical analysis, DMSMS information, results from tests of interest (e.g., radiation hardening), PCNs, GIDEP alerts, previous applications, justification for selection, expected life, qualification status, etc. Most of these data requirements are not needed for standard parts.[68]
- There are several informal processes that program offices can use to approve parts. For example:
    - One type of informal process considers similar information to the formal process. The principal difference is that there is no formal parts control board. Part approval is

[66] DoDI 5200.44, *Protection of Mission Critical Functions to Achieve Trusted Systems and Networks* (TSN), October 15, 2018.

[67] These potential requirements are a subset of the requirements in MDA policy.

[68] Since the SD-26 has not created a contract data requirement list and data item description for obtaining this data, either they would have to be developed or the information could potentially be built into the contractor Parts Management Plan since MIL-STD-11991A does call for government approval.

determined through consensus at a working-level meeting, typically chaired by program office and industry quality or product assurance SMEs. The informal parts approval process should be documented in the contractor Parts Management Plan. Data requirements should be a function of why government approval is required. For example, if the contractor proposes the use of a prohibited part, the request for approval should explain exactly why it is essential for that part to be used and should provide detailed mitigation plans associated with why the part is prohibited.

- The exception reports discussed in Section 5.4.2 represent another somewhat informal mechanism for parts approval. Program office part approval is assumed unless the part is rejected within 30 days. The SD-26 information requirement for the exception reports is much less detailed than the potential formal potential data requirements above.
- Theoretically, the program office may use the results of a Technology Readiness Review or a Production Readiness Review to approve a part.

Data needs differ when approving the use of a COTS assembly. Testing is difficult without field history of the use of the same version of the part. It is important to investigate whether requirements are met by obtaining as much data as possible. Therefore, in addition to the information contained in the COTS checklist, the program office may request a BOM to assess whether the assembly will meet requirements.[69] Furthermore, the program office may request vendor item control drawings or source control drawings, engineering descriptions, acceptance criteria, and suggested sources of supply. Since the program office is unable to control the manufacturing process, a destructive physical analysis may be conducted to assess quality and to check the accuracy of the data.

Parts approval may take a different form, depending on the phase of the life cycle. For example, during production and sustainment, the program office is likely to have assumed configuration control as defined by the TDP. Contracts may state that the program office must approve the use of any part that is not included in the TDP or that changes form, fit, or function.

Under certain circumstances, parts approval may not be unconditional. There may be usage restrictions driven by security, environmental, or technical performance considerations.

Any parts approval process gives the program office more control over final part selection and usage. However, it may be problematic for the program office to exercise that control. Part changes lead to rework, and the scope of that rework increases as a function of the time between initial part selection and part change. This often leads to increased government cost and sometimes schedule slippage.

5.4.3.3 Associated Program Office Parts Management Plan Content

A program Parts Management Plan should articulate:

- A breakdown by the risk-differentiated (and therefore oversight differentiated) subsystem aggregations, as appropriate, of the parts requiring program office approval;
- The process for receiving approval requests;
- The initial data necessary to make an approval decision (e.g., evidence that the part meets its allocated and derived requirements) and how that data will be obtained;[70]
- The decision-making processes and rationale for rejections;
- The process for resolving disagreements within the program office; and
- Decision record keeping and tracking.

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[69] Commercial vendors may refuse to provide a BOM for their COTS items. When that happens, the program office may use other criteria to approve the part.

[70] Some complex situations may call for additional, more detailed data that should not always be required.

5.5 Record Keeping and Metrics

The program office Parts Management Plan should identify the records it will keep and the metrics that will be formed and used from those records. See Section 6 for ideas and suggestions in this regard.

5.6 Review and Approval of Part Selections by Other Government Organizations

This section of the program office Parts Management Plan covers three situations where government organizations select parts. They are when:

- The government is the designing activity;
- GFP is used in the system; and
- The government makes part changes during maintenance.

Sections 5.6.1 through 5.6.3 suggest program office Plan content for these situations respectively.

5.6.1 Government Design

Since the government is the designing activity, contract language is not applicable. A document other than a contract (e.g., a memorandum of agreement, a memorandum of understanding, or a service agreement) is used to secure design services.

Government organizations (typically government laboratories) may design an entire system, a portion of a system, or a prototype that will be used by a contractor in the development of a system. In all of these situations, government part selections could be maintained into production and sustainment.

Program office oversight of government organization part selection should be identical to program office oversight of contractor part selection. The program office should not relax any requirements or constraints when another government design organization is performing the work.

- There should be an initial risk assessment.
- There should be a determination of the level and extent of program office oversight necessary to reduce the risk to an acceptable level.
- The necessary resources to perform the oversight should be obtained.
- A program office Parts Management Plan should be developed and that Plan should include a requirement for a design organization Parts Management Plan, as well as verification and validation of the government organization's part selection processes as discussed in section 5.4.

The government design organization should understand these requirements in advance and the resources for meeting these requirements should be factored into the cost quotation.

The program office Parts Management Plan content should align with section 5.4.

5.6.2 Use of Government Furnished Property

> *"Government property means all property owned or leased by the Government. Government property includes both Government-furnished property and contractor-acquired property. Government property includes material, equipment, special tooling,*

special test equipment, and real property. Government property does not include intellectual property and software."[71]

This section is not concerned with contractor-acquired property. The rest of this document is applicable to part selection for government-acquired property.

While there are contract requirements associated with government property, those requirements deal with how a contractor should manage government property.[72]

The use of GFP is included in this document because the contractor cannot apply the same level of part selection discipline and rigor to GFP that the contract requires for contractor-acquired property. Furthermore, the amount of part selection rigor and discipline used in GFP development may be unknown. GFP is selected for use by the program office because it meets the requirements of the system being developed and suitable for use. GFP cannot be modified without the approval of the contracting officer. If modifications are requested, then a logical conclusion is that either there is a defect or the GFP does not meet the requirements and should not have been selected for the program under development. In addition, the program office would have to pay its contractor to make changes.

From an oversight perspective, the government program office should apply rigor similar to what is used to approve the use of COTS on the system. If the candidate GFP cannot satisfy a similar level of scrutiny, then perhaps it should not be selected, although in some circumstances (e.g., communication equipment) there may be no other acceptable alternative.

The program office Parts Management Plan should describe any measures taken to avoid the use of GFP because of part selection risk concerns.

5.6.3 Government Part Changes during Maintenance

Analogous to section 5.6.1, there is no contractual language because there is no formal contract with another government organization.

As was the case for instances of government design, government organizations performing maintenance should be treated the same as contractor organizations performing maintenance from a parts management oversight perspective. While maintenance agreements do not normally involve a large number of part selections, part changes may occur because of obsolescence, other part availability issues, or small engineering changes.

Therefore, as indicated in section 3.2.1, the program office Parts Management Plan should call for the maintenance performing government organization to submit its own tailored Parts Management Plan. The program office Plan should either include a provision to approve the use of any parts that have not been previously approved in drawings or similar documents or direct program office part selection when a part is unavailable. If there are no engineering changes, the maintenance organization's Parts Management Plan could be limited to such an approval process. When engineering changes are likely, the government maintenance organization Plan should also include the general requirements of MIL-STD-11991. Any changes to form, fit, or function should be approved by the program office.

5.7 Monitoring Risk Changes

The final section of the program office Parts Management Plan discusses the monitoring and risk assessment of supply chain changes throughout the life cycle of the system along with the potential need

[71] See Federal Acquisition Regulation 45.101, Definitions.

[72] See Federal Acquisition Regulation 52.245-1, Government Property.

to make part changes to mitigate any new or changed risk as a function of likelihood and severity. The concept of reassessing supply chain changes is derived from the idea of a triggering event as discussed in SAE JA7496 and defined as:

> *An occurrence that results in a risk assessment to identify any changes in the risk profile and the associated impact of those changes on a system and parts within the system. Examples of such occurrences are changes in the existing design or interface; changes in the risk profile of the system and its external supporting processes or procedures; or planned assessments.*[73]

All three changes shown in the definition affect part selection risk.

5.7.1 Information on Associated Contractual Requirements

The current version of the SD-26 has no contract language associated with this subject. A future update to the SD-26 will include material for some of the monitoring activities listed below that may be performed by a prime contractor.

5.7.2 Oversight Considerations

Assuming that rigorous, risk-based parts selection occurred during initial design (and redesign), any part performance, system security, or availability risks should have been identified and mitigated if there was a determination that any of the risks were unacceptably high. However, the risk profile that existed during part selection could have changed as a result of a triggering event. For example:

- A different maintenance provider may have been selected or a current maintenance provider may be under new ownership;
- The OEM may have changed one of its (lower tier) suppliers—the OEM part number may or may not have changed;
- The part's reliability may have decreased; or
- A potential adversary could have placed its representation on the Board of Directors of a (lower tier) supplier or a foreign government may have made an investment in a supplier.

Parts management oversight should first assure that processes are in place to monitor for triggering events and that data are accumulated on the events themselves.[74] Information about potential triggering events should be derived from multiple sources. For example:

- Test failures or information reported through the Product Data Reporting and Evaluation Program.
- The results of a failure modes, effects, and criticality analysis that identifies potential failures in systems and equipment.
- Product changes identified through commercial industry issued PCNs, GIDEP reporting, or provided by the prime contractor.
- Lead time changes identified by part procurement organizations.
- Company financial health concerns as detected by the industrial base community.
- Changes to part vulnerabilities applicable to program protection or the protection of mission critical functions to achieve TSN.

[73] Adapted from SAE JA7496, *Cyber-Physical System Security Engineering Plan* (CPSSEP), June 2022.

[74] One impediment to the identification of triggering events is limited supply chain visibility. However, limited visibility may also impact the amount of rigor applied when a part was initially selected. The program office should nevertheless monitor for triggering events as thoroughly as data permits taking criticality into account.

- Yield changes identified by manufacturing organizations.
- Part availability changes observed by commercial or government maintenance providers.
- Supply chain changes identified by logistics centers.
- Counterfeit issues detected in part acceptance processes.
- Obsolescence as reported by the organizations performing DMSMS management for the system.
- Active Committee on Foreign Investment in the United States filings where a foreign entity seeks to acquire control over critical parts or components.
- Open source, intelligence community, or counterintelligence community information that may have an impact on potential foreign influence or other vulnerabilities on a part.

The parts management practitioner in the program office should be responsible for ensuring that all appropriate sources are collecting triggering event data and then providing that data to the organization responsible for

- Assessing the extent of risk change caused by the triggering event and
- Determining whether that risk change is serious enough to recommend a different part, change a supplier or a support (e.g., maintenance) provider, or different mitigating action (e.g., redesign).

During production, these responsibilities are often performed by the prime contractor with oversight from the program office. During sustainment, the program office either performs the work itself or arranges for contractor support to conduct the analysis. Typically, this is overseen by a SCRM focal point within the logistics function in the program office and carried out using an IPT. The parts management practitioner in the program office should be a member of that IPT and provide not only subject matter expertise but also inform the SCRM lead if some important monitoring activities are being overlooked.

Finally, the SCRM IPT in the program (or sustainment) office should provide oversight and ensure that all approved mitigating actions are being implemented. Depending on the scope of the change (e.g., whether there is a change to form, fit, or function), a field logistics organization may perform or oversee the implementation. In some specific circumstances, oversight may be led by a system security organization. The parts management practitioner in the program (or sustainment) office should monitor the thoroughness of these activities and point out any part selection concerns.

5.7.3 Associated Program Office Parts Management Plan Content

The program office Parts Management Plan should document how the monitoring, assessment, and implementation activities will be conducted and the specific role of program office parts management practitioners within them.

Other KSAs may be available (or even detailed) from specialized government organizations that could be elsewhere in the program office or external to the program office. Relationships with these other organizations should be built. A common example of the use of an external organization is the software and hardware assurance expertise (as part of system security engineering) provided by the Joint Federated Assurance Center. Other system security engineering functions may be performed by a specialized group within the program office.

Section 6. Record Keeping and Its Uses

This section discusses parts management record keeping, as well as how those records might be used to assess and improve the government's parts management oversight effectiveness. Because this document provides guidance to government practitioners of parts management, and because most parts management is currently performed by contractors with program office oversight, the guidance contained in this section focuses on: (1) records that should be collected from contractors regarding parts management practices, as well as specific part selections; and (2) records the program should collect describing its own oversight functions. This guidance can be generalized to the case where the government is directly selecting parts (by simply applying guidance to government organizations rather than contractors).

There are many benefits to keeping parts management records. For instance:

- **Identifying parts management resource constraints and justifying additional resources.** Parts management records are useful in measuring the scope of the parts management problem space and illustrating the potential value of dedicating increased resources to parts management. *See example 1 in Section 6.2.*
- **Improved parts management efficiency.** For a given set of resources, records allow program offices and higher echelon commands to observe where parts management resources are being allocated, where the most value is being had, and reallocating to the highest value-added areas. *See examples 1 and 2 in Section 6.2.*
- **Reducing systemic DoD risks.** Program offices make many decisions during part selection, some of which introduce risks. While individual risks taken may seem innocuous, records are useful in identifying large risks that emerge from the confluence of multiple decisions made across multiple program offices. *See example 6 in Section 6.2.*
- **Measuring the effects of disciplined parts management.** While it's often claimed that parts management has downstream benefits such as improved system reliability and reduced life-cycle costs, records can provide the empirical evidence decision makers need to justify parts management resourcing decisions. *See examples 1, 2, 3, 7, and 8 in Section 6.2.*
- **Monitoring trends in parts management practices.** As the new parts management paradigm is established, records will allow higher echelon commands to observe whether sound parts management practices are being adopted throughout the DoD, observe barriers to adoption, and develop courses of action to overcome them. *See example 4 in Section 6.2.*
- **Improved government-contractor relations.** Records can be used to produce summary statistics and identify trends in contractors' part selection processes and performance. This will aid the government in strengthening relationships and building trust with contractors who select parts. It will also provide program offices an opportunity to indicate their part selection preferences to contractors. *See example 5 in Section 6.2.*

The benefits of parts management record keeping are illustrated more explicitly in Section 6.2 through a series of examples, tying specific records to specific outcomes. The examples in Section 6.2 are, by necessity, an incomplete list of uses of records, and program offices should carefully consider additional records that may be of value. Further, it's often not known in advance how certain records will be useful, therefore program offices should also consider keeping records that *may* be useful when the overhead cost of collecting them is not high. Guidance is provided to aid program offices in considering what records may be useful.

Section 6.1 provides examples of parts management records that are useful to collect. Minimal context is provided in Section 6.1 for how these records will be used, but the examples are designed to be valuable from either intuition or direct experience. Section 6.2, in contrast, provides specific examples for how some of the records listed in Section 6.1 may be used to gain meaningful parts management insights, for both government program offices and higher-echelon commands. This document is meant to provide initial record keeping guidance for a new parts management paradigm. Subsequent versions will incorporate additional material such as lessons learned, use cases of observed benefits of parts management record keeping, and standardized data dictionaries to make record keeping more effective.

6.1 Useful Parts Management Records to Collect

There are two basic approaches to keeping parts management records for the purposes of assessing and improving the government's parts management oversight. The first is to start by determining what questions should be answered, and then considering what records are needed to answer those questions. The second is to rely primarily on intuition and experience to determine records that are likely to have future value, possibly without a clear hypothesis in mind. The latter approach is the subject of this subsection; Section 6.2 addresses the former.

It's often difficult to conceive of every possible question the government may need answered in the future, and hence gathering records without a specified use is of value. To aid program offices in determining a set of records to be kept without the context of a specific question, three subcategories of records have been defined: *contract and system records, parts records*, and *practices records*.

Contract and system records provide needed context to make other records more useful. Data elements about the contract will include things such as the company name (and subdivision if applicable), location(s), the contract's purpose (such as a development of a new system or component, or a redesign), and timelines. Data elements about the system include items such as the expected users and expected warfare areas.

Parts records describe the parts being selected for a system. This will include information about specific parts, such as whether the part is already used in other DoD systems, whether the part required explicit program office approval, and whether any exception reports were required for the part to be selected. Parts records also include *aggregate* data elements across all parts selected, such as the number of parts selected which are (not) already in the DoD supply system, the number requiring program office approval, and how many parts were included in exception reports.

While data elements about the specific parts selected are more informative than aggregate data (the latter can always be derived from the former), in situations where collecting part-level records is not practical, aggregates are a valuable alternative. Collecting part-level records may be impractical, for example, when the cost for a contractor to collect and provide them to the program office is high. Most parts records are more useful if further qualified with reason codes; i.e., it's much more useful to know why a part appeared on an exception report (DMSMS criteria, microelectronics traceability, etc.), then it is to simply know that it appeared on one. Parts records can also include part attributes such as the required and selected mean time to failure (MTTF), cyber figure of merit (CFOM), and survivability, which can often be valuable when assessing the effectiveness of parts management. This type of data is often gathered by other stakeholders (e.g., engineers); what's important is that someone within the program office gathers it. Lastly, parts records can include administrative aspects of the specific parts selected, such as manufacturer part numbers and commercial and government entity (CAGE) codes.

Practice records, in contrast, describe the parts management process as a whole vice specific parts and aggregates. For instance, practice records could include whether a contractor was required to have a contractor Parts Management Plan, and whether the Plan was delivered to the program office. Other examples include whether and how the program office conducted audits on contractors' parts management processes, and overall costs related to parts management oversight (often measured in manhours). Practice records play a crucial role in assessing the effectiveness of the government's parts management efforts.

Sections 6.1.1, 6.1.2, and 6.1.3 list further examples for each category of records. Most of these examples are records with clearly defined values, such as categorical responses (e.g., a contractor Plan *was* or *was not* required) or quantitative values (e.g., the MTTF was *x*). However, at times the examples suggest a narrative description of an aspect of the contract or system (e.g., description of the need for a system redesign). This is because centralized parts management record keeping in the DoD is an evolving field, and standardized, categorical responses for many questions have not yet been established. Later iterations of this document will include a data dictionary to standardize the set of possible responses to non-quantifiable questions, but for the time being, narrative descriptions are valuable because they can be used in conjunction with manual or automated language processing. Lacking a centralized data dictionary, a best practice is for individual program offices to create their own well-documented data dictionary.

These lists are meant to stimulate program offices to consider records that would be valuable to have. Because there are innumerable records which could be of value, program offices should balance the time and effort of gathering records with their potential value. As preliminary guidance, each record in the below lists is marked as either a *basic*, *intermediate*, or *advanced* parts management record keeping practice. Regarding record keeping formats, there are not yet standardized reports program offices are required to submit, so program offices should determine the best format to capture records. Program offices are also left to determine the best means of collecting records, such as who collects the records (the prime contractor, a subcontractor, or the program office itself) and when.

6.1.1 Contract and System Records

Contract and system data elements are intended to provide useful context that will make other records more useful. Examples are provided in Table 3.

Table 3. Contract and System Records Examples

Category	Level	Description
Contractor information	Basic	Contractor’s company name (and subdivision if applicable).
	Basic	Contractor’s location.
	Intermediate	Names, locations, and the tasks assigned to any subcontractors, by tier. Note that subcontracting tiers 1 and 2 generally capture the bulk of significant functions.
	Intermediate	Technical points of contact for the contractor.
Contract purpose	Basic	Whether the contract is for the development of a new system, a system redesign, or to replace an existing part.
	Basic	In the case of a system redesign, a narrative description of the capability being improved or deficiency being corrected.
	Intermediate	In the case of a contract to replace an existing part or parts, a narrative description of the event that triggered the required replacement.
Contract information	Basic	Timelines for the contractor to submit its Parts Management Plan to the government (including initial submittals, final submittals, and updates to parts lists or BOMs).
	Basic	The *actual* dates the contractor Parts Management Plan was submitted to the government (initial, final, and updates to parts lists).
System purpose	Basic	A narrative description of the systems purpose, with details such as the expected warfare areas the system will support (e.g., anti-air warfare, electronic warfare, missile defense).
	Basic	A narrative description of expected users of the system. To ensure records are specific yet general enough to compare across systems, keywords such as the service component (e.g., U.S. Army, U.S. Navy), warfighter type (e.g., infantry, surface fleet, submarine fleet), and platform (e.g., F-35, Arleigh Burke class destroyer) should be included.

Category	Level	Description
System information	Basic	Total number of unique parts to be selected.
	Intermediate	Target levels of operational availability (Ao) and other performance metrics for the system.

6.1.2 Parts Records

Parts records describe the parts that were selected for use in a system. This can include attributes particular to parts management (e.g., whether an exception report was required, commonality information), as well as more conventional attributes related to the part performance (e.g., MTTF and CFOM). Parts records can consist of part-level data elements describing each part selected on an individual basis, as well as aggregates summarizing all parts selected. While the former is more valuable, in certain circumstances gathering the latter from parts management contractors may be more practical, so examples of each are given. Section 6.1.2.1 provides examples of aggregates and 6.1.2.2 lists part-level examples.

Note that the examples provided need not only apply to the parts that were ultimately selected for use in the system; they can, in general, apply equally well to the parts initially submitted by the contractor, some of which may have been rejected by the program office. As an example, one aggregate listed in Table 4 is the number of parts already having a national stock number (NSN). As a means of understanding parts management's value, it's useful to compare how many parts initially submitted had an NSN to how many parts actually used had an NSN. See example 3 in Section 6.2 for a discussion of this topic.

6.1.2.1 Aggregate Examples of Parts Records

Table 4 provides examples of parts record aggregates. For concision, many are specified as the "number" of parts meeting certain criteria; this should be interpreted as both the raw number and percentage of parts meeting those criteria.

Table 4. Aggregated Parts Records Examples

Category	Level	Description
Standardization	Basic	Number that are MIL-SPEC.
	Basic	Number of non-standard parts.
	Basic	Number of restricted use parts.
Qualified alternates	Basic	Number that have qualified alternates.
FOCI	Intermediate	Number considered to have elevated FOCI risk. Program offices can define for themselves what's considered an elevated FOCI risk; criteria should be briefly documented within their parts management records.
Commonality	Basic	Number used in other government assets, as evidenced by already having an NSN.
Hazardous materials	Basic	Number that are, or contain, hazardous materials.
Government approval	Basic	Number that require government approval before selecting.
	Intermediate	Number that require government approval before selecting, categorized by reason. Program offices may record the amount and percent of parts requiring approval because of, e.g., their use in flight safety systems, hazardous material, costs, and the expected criticality of part failure.
	Intermediate	Number of parts that were rejected during government review. It's also valuable to record the number of approved parts which were proceeded by another part being rejected. The latter distinguishes between cases where, for example, 10 parts were the contractors second choice (10 total rejections against

Category	Level	Description
		10 parts), and cases where a single part was the contractor's 11th choice (10 rejections against a single part).
	Intermediate	Number that were rejected after government review, categorized by reason. Reasons for rejection may include pending obsolescence, limited supplier capacity, FOCI, cyber vulnerability, etc.
Exception reports	Basic	Number of parts that were submitted on an exception report and were ultimately approved for use in the system.
	Intermediate	Number of parts that were submitted on an exception report and were ultimately approved for use in the system be broken out by category of exception report.
	Basic	Number of parts that were submitted on an exception report and ultimately not allowed to be used in the system.
	Intermediate	Number of parts that were submitted on an exception report and ultimately not allowed to be used in the system broken out by category of exception report.

6.1.2.2 Part-level Examples of Parts Records

Table 5 provides examples of part-level records. As previously mentioned, in addition to typical parts management features (such as whether parts were MIL-SPEC, already had an NSN, or contained materials of interest), parts records can also include features regarding part performance typically found in engineering or other disciplines, such as MTTF and CFOM. One entry in Table 5 captures examples of this latter category collectively. These are often gathered by other sections of the program office, in which case the parts management practitioner need not record the data as well. Parts management practitioners are responsible for understanding what data elements are being collected elsewhere, and thus what data elements they will be responsible for collecting.

Table 5. Part-level Parts Records Examples

Category	Level	Description
Category of part	Basic	The parts category, e.g., electrical, electronic, mechanical, material, process, COTS assembly.
Description	Basic	A narrative description of the part.
Standardization	Basic	Whether the part is a standard part, evidenced as being included on a Qualified Products List (QPL), PPL, or similar document.
	Basic	List any strict prohibitions for a part.
	Basic	Whether a part is or is not MIL-SPEC.
Qualified alternates	Basic	Whether a part does or does not have a qualified alternate.
	Advanced	The number of qualified alternates for a part (as opposed to only listing whether there are any qualified alternates).
Commonality	Basic	Whether the part does or does not already have an NSN.
	Intermediate	How many other systems use this part.
	Advanced	Miscellaneous SCRM data for parts already in use by the government, such as average wholesale stock-on-hand, demand rates, procurement lead times, repair turn-around times, and vendor-specific risk assessments.
DMSMS	Advanced	A quantifiable DMSMS risk assessment for the part. Quantifiable terms may include the expected years of availability and expected production capacity over time.
Material composition	Basic	Whether a part contains materials of interest. Particular materials will vary by system and over time, but would include materials such as lead, plastics, or various rare earth minerals.
Hazardous materials	Basic	Whether a part is, or contains, hazardous material or not.

Category	Level	Description
Government approval	Basic	Whether a part requires government approval before selecting.
	Intermediate	If government approval for a part is required, provide a narrative description explaining why. Keywords may include, for example, use in flight safety systems, hazardous materials, costs, and the expected criticality of part failure.
	Advanced	For parts requiring government approval, the number of parts that were rejected, by reason code, before a part was approved. Reason codes may include pending obsolescence, limited supplier capacity, FOCI, cyber vulnerability, etc.
Criticality	Intermediate	Whether the program office has identified a part as critical.
	Advanced	Measurement of a part's criticality. In the most rigorous case, this would involve assigning a numeric score to each part's criticality. The least rigorous method that still provides more context than a simple "Yes" or "No" response would be a subjective assessment of whether a part has "High," "Medium," or "Low" criticality.
Exception reports	Basic	Whether a part required an exception report to be approved before selection.
	Intermediate	The reason/category for any exception reports this part appeared on. Note that in theory a part may require more than one exception report.
Conventional performance data	Basic	If not recorded by other stakeholders in the program office (e.g., engineers), parts management practitioners should consider collecting records such as: operational and non-operational temperature ranges; MTTF and mean time between critical failure; mean time between maintenance actions and mean time to repair; CFOM or other quantifications of cybersecurity; part size; and weight.
Part details	Basic	Manufacturer part numbers for parts selected.
	Basic	Manufacturer CAGE codes for parts selected.
	Basic	Manufacturer name for each part.
	Basic	Quantity used per assembly and system
	Intermediate	Manufacturer technical point of contact for each part.
	Basic	Technical information identifying where a part is installed in the system.

6.1.3 Practice Records

Practice records describe the quality of both contractors' and the program office's overall parts management practices. They also include overarching parts management oversight costs. Practice records are therefore crucial for evaluating the cost-effectiveness of the program office's parts management oversight. Examples are provided in Table 6.

Table 6. Practice Records Examples

Category	Level	Description
Standardization	Basic	Whether or not the contract requires adherence to any existing DoD parts management documents. If so, list them, such as MIL-STD 11991A (general requirements) or MIL-STD 11991A (detailed requirements).
	Basic	List any prohibitions that apply to all parts.
Parts Management Plans	Basic	Whether the program office had a documented Parts Management Plan prior to the contract's start date.
	Basic	Whether the prime contractor had a Parts Management Plan, and if so whether it was required to be reviewed and approved by the program office before the contractor could begin work.
	Intermediate	How many subcontractors, by tier, had Parts Management Plans, and whether any were required to be reviewed and approved by the program office. If some but not all subcontractors required a Plan, provide reasons.

Category	Level	Description
	Intermediate	If any subcontractor Parts Management Plans required government approval, list any that were initially rejected.
	Advanced	Indicator variables for whether the program office considered various factors as part of its parts management efforts. Indicators are useful to distinguish basic program office Parts Management Plans from more advanced ones. Example indicators might include part reliability (most/all Plans will consider this), part commonality with other DoD systems, and the manufacturer's financial health (less robust Plans may not consider these latter two). Note that in some cases these indicators could also be determined retroactively by reading a program office's program office Parts Management Plan.
Verification	Basic	Whether verification efforts (e.g., audits, personnel embeds, DCMA surveillance) were performed by the government to confirm contractor Parts Management Plan processes were being followed. If so, when, how many, and on which contractors.
	Intermediate	If performed, the specific aspects of a contractor Parts Management Plan that were verified.
	Basic	Verification methods used. If used, how many, where, and for what reasons.
	Advanced	Narrative descriptions of the outcomes of verification efforts.
Costs	Intermediate	Number of parts management FTEs. If applicable, records should specify how FTEs were distributed across different parts management tasks. The costs of employing these FTEs should also be specified.
	Advanced	Costs associated with specific parts management oversight functions. Costs can generally be measured in manhours. Examples of parts management functions would include: reviewing a contractor Parts Management Plan; performing audits; embedding government personnel in contractor offices; reviewing and approving specific part selections.
Resourcing	Intermediate	Binary indicator for whether the program office Parts Management Plan was resourced per its requirements (required FTEs, planned audits, embeds, etc.).
	Advanced	The resourcing shortfall for executing the program office Parts Management Plan. That is, the dollar value of resources received to perform parts management oversight, versus the dollar value required to execute the Plan.
	Intermediate	Binary indicators for whether KSAs were acquired in accordance with the program office Parts Management Plan. Binary indicators should be recorded for each individual KSA identified in the Plan (SCRM, system security, manufacturing, etc.).
Triggering event	Advanced	Triggering events which, after a risk assessment, lead to a reselection of parts. Examples of triggering events may include a new FOCI risk entering the part's supply chain, or even a change in supplier that introduces an increased risk of tampering. If a part has triggering events, identify the part number and CAGE code, and provide the quantitative triggering criteria where possible, or a narrative description when necessary. Quantitative criteria are preferred because they are unambiguous; note quantitative criteria bring an implicit requirement to keep records on the data needed to calculate them.
Exception reports	Basic	Whether a program office Parts Management Plan requires the use of exception reports.
	Basic	Number of exception reports submitted to the government, broken out by category.
	Intermediate	The dates any exception reports were received and responded to.
	Advanced	The average number of manhours required to process an exception report.

6.2 Example Benefits and Metrics of Parts Management Record Keeping

Parts management record keeping has several benefits for program offices and higher echelon commands. As mentioned previously in this document, disciplined parts management produces effects such as reduced life-cycle costs, improved system reliability, and improved cyber resiliency. Parts management record keeping allows these effects to be rigorously documented and quantified. Parts management records can also highlight areas where further analyses and fact finding should be conducted to determine root causes of potential issues. Both of these features improve decision-making with respect to parts management activities and investment.

This section provides a series of concrete examples of how parts management records can be used in practice. The examples progress from simple cases which provide immediate insights for parts management practitioners, to more detailed empirical studies explaining causal relationships between parts management and warfighting effectiveness. Program offices can use these examples to consider additional questions they would like answered, and hence what records should be kept. The examples and their benefits are not intended to apply to a single program office. Behavior identified by one program office may be useful to another, and some of the examples require collecting records from multiple program offices for analysis by a higher echelon command.

Each example is structured in three sections: *Records required*, which lists the records that should be collected during system development; the *Benefits and Metrics* from collecting these records; and a *Narrative* section providing additional context. For more advanced examples, additional records will normally need to be collected after the part selection process, possibly by entities outside the program office. Such post-selection records are not listed under the *Records* section, but would be mentioned under *Narrative*.

Example 1: Benefits of, and the capacity for, program office review and approval of parts

Records required

- Number of parts explicitly reviewed and approved by the program office.
- Number of parts selected only after rejecting a contractor's initial selection.
- Total parts selected.

Outcome

Greater understanding of the need to dedicate additional resources to program office approval of parts.

Narrative

By observing the number of parts it explicitly reviewed, as well as the number it rejected during review, a program office can gain an understanding of how frequently contractors are submitting part selections that do not meet the program office's expectations. If the rate of rejection is high, *and* the program office only had resources to review and approve a small fraction of total parts, then the program office can justify additional resources being allocated to part review and approval. This may involve reallocating resources within the program office, or seeking more resources from its headquarters.

While a simple example that could be improved by further analysis such as the demonstrated long-term effects of part approval (see example 7), this has the benefit of being intuitive and providing immediate insights. Presumably, a program office would only reject a part if there were an eventual benefit to the warfighter.

Example 2: Benefits of verification efforts on the part selection process

Records required

- How many verification efforts a program office conducted to review a contractor's part selection process, categorized by type (audits, personnel embeds, DCMA surveillance, etc.).
- What percentage of parts reviewed by a program office were rejected.
- If applicable, all the above records should be categorized based on the division of the prime contractor, or subcontractor, for which the verification effort was conducted, or by whom the rejected part was selected.

Outcomes

- Higher echelon commands gain an understanding on whether verification efforts reduce the rate at which contractors select parts that must be rejected by program offices.
- In the situation where a single program office has collected records from multiple contractors, subdivisions, or subcontractors, that program office can likewise learn the effect of its verification efforts on part rejection rates.

Narrative

Gathering records on verification efforts and part rejection rates will allow the program office or higher echelons to estimate the magnitudes of causal effects for each verification on rejection rates. Presumably, if verification efforts are valuable, then more of them would lead to lower rates of rejection. This is valuable because a lower rate of rejection implies less need to review part selections. However, verification efforts can be expensive if they require significant manhours. By improving understanding of how much value verification efforts add, the government will be better positioned to decide whether to invest more in these functions.

Example 3: Effects of parts management on reducing part proliferation

Records required

- Number of parts selected that did not previously have an NSN.
- Number of parts that were rejected by the program office and did not previously have an NSN, and were eventually replaced with a part that did have an NSN.

Outcome

A measurement of how much less part proliferation occurred due to the program office prioritizing commonality of parts.

Narrative

This simple example provides an easy way of measuring a core function of parts management, which is the reduction of the proliferation of parts. Comparing the number of new NSNs that would have been needed had the government not rejected any parts shows the effectiveness of parts management in reducing proliferation. The analysis can be enhanced using a cost-savings measurement for reduced proliferation, which could be either internally generated or informed by existing publications such as NAS 1524, "Standardization Savings, Identification, and Calculation" (refer to Section 7 for more information on NAS 1524).

More complex extensions can lead to additional insights. For instance, rather than looking only at whether a part had an NSN or not, collecting records on the actual demand for parts selected by other DoD users will provide a fuller picture of the system's supportability. From a higher echelon perspective, indicator variables specifying whether program offices did or did not consider part commonality will help explain differences across program offices with respect to part proliferation.

Example 4: Changes in the use of Parts Management Plans over time

Records required

- For each program office, whether they used a Parts Management Plan to guide their parts management efforts.
- For each program office, how many contractors they employed (primes and subcontractors) which did and did not have a contractor Parts Management Plan.

Outcomes

- Insight into the prevalence of program office and contractor Parts Management Plans throughout the DoD over time, which is a useful indicator of whether program offices are or are not emphasizing parts management.
- Insight into the effect of program office and contractor Parts Management Plans on key outcomes such as life-cycle costs, system reliability, and part proliferation.

Narrative

While providing useful insight in its own right, a time series of Parts Management Plan usage may help higher echelon commands explain other phenomena being observed, such as changes in life-cycle costs, system reliability, or parts proliferation. For instance, explaining life-cycle costs would require a robust empirical study involving several factors, but if records on the use of plans are kept, analysts may find that the use of government and/or contractor Parts Management Plans has a statistically significant effect on costs. Though not listed as a separate example, higher echelon commands should also consider collecting time series records on parts management costs. When combined with analyses of the effects of Parts Management Plans on outcomes like life-cycle costs and system reliability, a cost-benefit analysis for parts management could be conducted.

Example 5: Knowledge sharing between program offices for improved contractor selection

Records required

For each program office and system developed, narrative descriptions of the outcomes of any audits that were performed.

Outcome

A database, that can be shared across program offices, to review lessons learned and experiences stemming from audits of part selection contractors. This will allow program offices developing new systems to make more informed decisions when choosing a contractor for part selection.

Narrative

In contrast to example 2, this example uses the details of particular audits to extract useful information for parts management practitioners. Unlike the other examples presented in this section, it relies exclusively on qualitative data, namely the narrative descriptions of program offices' audits. When a program office chooses a contractor to perform part selection for a new system, the choice may rely on past experience, direct information from the candidate contractors, or a combination of these. By collecting the findings and lessons learned from past audits, program offices will also be able to incorporate knowledge from other program offices to improve their own decision-making.

In time, such a database could become large, making it impractical to read every entry before selecting a contractor. Simple techniques can reduce the size of relevant entries, such as searching for keywords, and more advanced techniques such as natural language processing may also be useful. As parts management records keeping matures as a discipline, a higher-echelon command can play a coordinating role in making the database more useful by creating standardized data entry requirements following a parts management audit.

Example 6: Monitoring the extent of exception reports

Records required

For each program office, the number of exception reports received by category.

Outcome

Higher echelon commands are able to identify potential sources of risk stemming from extensive use of exception reports throughout the DoD.

Narrative

Collecting records on the use of exception reports is extremely valuable for higher echelon commands analyzing supply chain risks. While a single exception report on, for instance, the traceability of microelectronics may seem innocuous to a program office, when aggregated across the DoD several such exception reports may indicate a systemic risk to the DoD's microelectronic supply chain. Continuous monitoring of the use of exception reports will allow higher echelons to intervene before risks get unacceptably high.

Example 7: Effect of program office review and approval on Ao

Records required

- For each program office and system, the percentage of parts that required program office approval.
- For each system, the target level of Ao.

Outcome

An understanding of whether the extent of program office approval of parts leads to a higher chance that a system meets its target level of Ao once deployed.

Narrative

Like example 4, this example highlights a situation where parts management records can play a role in a broader empirical analysis. For deployed systems, an empirical assessment of why they have or have not met its targeted Ao levels could be performed using multiple factors. For instance, the realized availability and training of maintenance personnel would be an important factor, as would the funding and availability of spare parts and the environmental conditions in which a system has operated. Another important factor may be the quality of parts management during system development, which can be proxied by the percentage of selected parts the government was able to review and approve. If an empirical study finds that more government review and approval leads to a higher chance of meeting Ao goals, this would provide justification for allocating more resources towards part review.

Other parts management records would be useful for this empirical analysis, such as the extent of audits and embeds during part selection, or a simple indicator of whether a program office Parts Management Plan was used. Prior to performing the study, it's unknown which records will prove explanatory for realized Ao, so in general collecting more records is better. Also note that, like most empirical studies, the one described here may have confounding factors. For instance, it may be the case that program offices with stronger parts management are also those who are more diligent, have a better understanding of the systems they develop, and hence are better at estimating deployed Ao. While challenging, analysts are accustomed to dealing with such confounding factors, and having records to perform detailed empirical studies is still valuable.

Example 8: Effect of cybersecurity KSAs on reducing cyber incidents during system deployment

Records required

For all program offices, binary indicators for whether the program office acquired the needed cybersecurity-related KSAs per its Parts Management Plan.

Outcome

Understanding of how resourcing cybersecurity expertise to support part selection impacts the prevalence of cyber incidents during system deployment.

Narrative

By collecting records across multiple program offices on whether the requirements for cybersecurity KSAs were properly resourced, higher echelon commands can assess whether properly resourced programs do, in fact, experience less cyber incidents. Records would also need to be collected during system deployment on the number of observed cyber incidents. To make the analysis more complete, multiple binary indicators should be collected to identify the presence or absence of specific cyber-related KSAs, such as knowledge of critical hardware and software vulnerabilities, knowledge of cyber-attack and mitigation strategies, and so on.

This is another example where records from different program offices are being compared. To ensure like-systems are being compared to one another, higher echelons can: (1) identify control factors that suggest two systems should have a similar amount of cyber incidents and perform a rigorous empirical analysis (as in examples 4 and 7); or (2) more informally, compare results among a set of systems that are believed to be similarly vulnerable to cyber-attacks, *before accounting for KSAs during part selection*.

These examples are inherently an incomplete list, as the types of insights that can be gained from parts management records is only limited by the practitioner's ability to ask probing questions and develop a record keeping plan to answer them. The provided examples are meant to fuel discussion within program offices and higher echelons which will result in empirically backed findings that will inform future parts management investment decisions. Updates to this document[75] will include examples of record keeping being used in practice as the parts management community accumulates real-world findings on parts management effectiveness.

[75] Update frequency will be a function of how many program offices are early adopters of this guidance.

Section 7. Parts Management Support

DoD acquisition activities and contractors have several resources available to aid in effective parts management. The following sections detail resources and services, tools, and available training.

7.1 Resources, Tools, and Services

7.1.1 Item Reduction Program

The DoD Item Reduction (IR) Program consolidates items in the Federal Logistics Information System (FLIS) with generally similar form, fit, and function. The program reviews the items in the FLIS, which affords visibility of items across program offices, military services, and federal agencies. Successful IR actions facilitate parts selection by achieving the following:

- *Increased standardization of items in the FLIS*. Eliminating redundant, superseded, out-of-date, or no longer required items reduces the number of parts that can be selected.
- *Economies of scale in acquisition*. Increased demand for a standardized item of supply increases competition from suppliers, lowers costs, and shortens acquisition lead times.
- *Efficiencies in storage and distribution*. Reduction in items of supply from standardization decreases storage and distribution requirements at all levels, from shipboard to major depot, shrinking the required logistic footprint.
- *Increased reliability*. Increased item standardization results in more extensive performance history for individual parts, which leads to more precise performance estimates.

The IR Program operates independently, and no actions by parts management practitioners are needed to obtain these benefits.

7.1.2 Government-Industry Data Exchange Program

The GIDEP is a Defense Standardization Program (DSP)–sponsored activity that brings together government and industry participants with the aim of sharing, and consolidating, technical information essential during the research, design, development, production, and operational phases of the life cycle of systems, facilities, and equipment. GIDEP-consolidated data materially improves decision-making during the acquisition and logistics phases of the life cycle and reduces costs in the development and manufacture of complex systems and equipment. The byproduct of this is improved quality and reliability of systems and components.

From a parts selection perspective, GIDEP provides information that part selecting organizations should consider and that program office parts management practitioners should use when conducting oversight. Most importantly in that regard, GIDEP contains reports identifying some potential counterfeit risks and disseminating part discontinuation notices. Another important feature is that GIDEP publicizes PCNs that may lead to the need to replace parts that have already been selected.

GIDEP's web address is www.gidep.org.

7.1.3 DMSMS and Parts Management Working Groups

The DMSMS and Parts Management WGs offers a forum to promote, shape, and coordinate government and industry approaches to effective parts and DMSMS management procedures in support of the warfighter. Organized by the Office of the Secretary of Defense for Research and Engineering, the WGs provide organizations with several benefits, such as networking opportunities with multiple levels of government and industry, a forum to share innovative tools and practices, international partner collaborations, pertinent news and policies related to parts and DMSMS management, increased knowledge of resources, and opportunities to contribute to the strategic objectives of both communities. The DMSMS and Parts Management Knowledge Sharing Portals described below enable practitioners to keep abreast of the WGs activities that may impact job performance and provide information on future and past events.

7.1.4 ASSIST

The ASSIST, formerly known as Acquisition Streamlining and Standardization Information System, is a web-based application that serves as the DoD's official source for standardization documents developed, maintained, and used by DoD. The ASSIST is a critical DoD application that houses requirements documents cited in defense acquisitions for the development, acquisition, and logistic support of systems and equipment used by the DoD. Through the ASSIST, the DoD is able to maintain centralized control over the indexing, cataloging, management, and distribution of standardization documents and related information in accordance with DoDM 4120.24. The ASSIST is located at https://assist.dla.mil.

7.1.5 DMSMS Knowledge Sharing Portal

The DMSMS Knowledge Sharing Portal (DKSP) is focused on being a one-stop provider of DMSMS related information, resources, and material to empower the Department of Defense (DoD) community, both Organic and Industrial, to implement best practices for monitoring, tracking, resolving, and performing analytical logistic and engineering analysis related to DMSMS impacts. The portal contains procedural guides, training resources, policy and guidance, and an extensive document library. The portal's web address is https://www.dau.edu/cop/dmsms.

7.1.6 Parts Management Knowledge Sharing Portal

The Parts Management Knowledge Sharing Portal is designed to provide an easily accessible knowledge base for parts management related information and a forum for parts management related discussions, to establish parts management best practices across DoD and industry. The portal contains procedures, guides, training resources, policy and guidance, and a document library. The portal's web address is, https://www.dau.edu/cop/pmksp.

7.1.7 Defense Logistics Agency Land and Maritime Document Standardization Unit

The Defense Logistics Agency (DLA) Land and Maritime Document Standardization Unit is the preparing activity for thousands of standardization documents covering a wide variety of electronic components and other items. The DLA Land and Maritime website's MIL-SPEC page has search tools to aid in the identification and selection of high-quality, reliable standard electronic components. The Document Standardization Unit coordinates and prepares technical documents in 70 Federal Supply Classes and offers engineering support to DoD customers using these documents: https://landandmaritimeapps.dla.mil/offices/Doc_Control.

7.1.8 Pin Point

Pin Point is a government-only query engine for researching parts in the federal supply chain. Pin Point provides users with rich technical and logistics information about NSNs and tens of millions of commercial parts. Defense and industry part managers use the system to reduce part duplication; manage risks such as long lead times, obsolescence, and the presence of restricted materials; evaluate part similarity; and conduct market and price research.

Pin Point aggregates data from multiple sources, including databases and legacy systems internal to the DoD enterprise, as well as external web-based sources, such as manufacturer and supplier websites. Pin Point uses artificial intelligence to extract and infer part properties from narrative text, specifications, part numbers, and product descriptions, and provides parametric searching on physical and logistic part properties. Users have access to complete, continually updated technical, management, and reference data about NSNs and commercial parts. Pin Point is accessed using a DoD common access card (CAC) at https://pinpoint.xsb.com. Direct questions can be sent to pinpoint-admin@xsb.com.

7.1.9 Weapon System Impact Tool

The Weapon System Impact Tool (WSIT) provides access to information about weapon systems and specifications associated with NSNs. The tool helps to group parts influenced by a specification and helps program offices evaluate the effect of specification changes on weapon systems. WSIT's query feature provides a list of weapon systems in which the NSN associated with the specification is used. In addition to the raw number of weapon systems using the affected part, WSIT provides a breakdown of the part's use by military service component.

WSIT allows users to search by military specification, federal specification, commercial item description, or non-government standard. It can supply a list of the NSNs and controlling part numbers referenced in that document. WSIT is restricted to CAC holders and can be accessed at https://wsit.xsb.com.

7.2 Training

7.2.1 DAU Courses Related to Parts and DMSMS Management

- LOG 0630 Introduction to Parts Management
- LOG 0640 DMSMS: What the Program Manager Needs to Do and Why
- LOG 0650 DMSMS Fundamentals
- LOG 0660 DMSMS Executive Overview
- LOG 0670 DMSMS Research Essentials

7.2.2 DAU Parts and Material Life Cycle Management Credential

- LOG 0320 Preventing Counterfeit Parts from Entering the DoD Supply Chain
- LOG 0380 Provisioning and Cataloging
- LOG 0390 Additive Manufacturing Overview
- LOG 0400 Additive Manufacturing Case Studies
- LOG 0470 Sustaining Engineering
- LOG 0510 System Retirement, Disposition, Reclamation, Demilitarization, and Disposal
- LOG 0630 Introduction to Parts Management
- LOG 0640 DMSMS: What the Program Manager Needs to Do and Why
- LOG 0650 DMSMS Fundamentals
- LOG 0660 DMSMS Executive Overview
- LOG 0670 DMSMS Research Essentials
- CON 0040 Market Research
- CLE 019 Modular Open Systems Approach
- CLE 026 Trade Studies

The Parts and Material Life Cycle Management Credential (CLCL 014A) is available to workforce members from any defense acquisition workforce functional community, including life cycle logistics, systems engineering, production, quality and manufacturing, and program management. It includes a scenario-based end-of-credential assessment. The total time to complete the 13 online-training modules is approximately 40 hours, excluding the time to complete the end-of-credential assessment. Additional information on the DAU credentialing program is available at https://www.dau.edu/credentials.

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DoDI 4160.67, *DoD Counterfeit Policy*, March 6, 2020.

DoDI 4245.15, *Diminishing Manufacturing Sources and Material Shortages*, November 5, 2020.

DoDI 5000.02, *Operation of the Adaptive Acquisition Framework*, January 23, 2020.

DoDI 5000.83, *Technology and Program Protection to Maintain Technological Advantage*, May 21, 2021.

DoDI 5000.88, *Engineering of Defense Systems,* November 18, 2020.

DoDI 5000.90, *Cybersecurity for Acquisition Decision Authorities and Program Managers*, December 31, 2020.

DoDI 5000.91, *Product Support Management for the Adaptive Acquisition Framework*, November 4, 2021.

DoDI 5000.93, *Use of Additive Manufacturing in DoD*, July 6, 2021.

DoDI 5200.39, *CPI Identification and Protection Within RDT&E*, October 1, 2020.

DoDI 5200.44, *Protection of Mission Critical Functions to Achieve Trusted Systems and Networks* (TSN), October 15, 2018.

DoDI 5200.xx, *Access to Assured Microelectronics* (Forthcoming).

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DoDM 4245.15, *Diminishing Manufacturing Sources and Material Shortages*, October 26, 2022.

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Appendix A. Parts Management Policy and Guidance

As described in Section 1.3, parts management reflects two broad types of policy and guidance—overarching and that which is pertinent to engineering design considerations. This appendix provides more detailed information on pertinent policies and guidance related to the acquisition pathways, systems engineering, system security engineering, and SCRM.

A.1 Pertinent Guidance Related to the Acquisition Pathways

Table 7. Parts Management Guidance Content by Acquisition Pathway

Acquisition Pathway	Summary of Parts Management–Related Guidance Content
MCA	Parts management content appears in the roles and responsibilities, as well as activities with the acquisition phases. During the TMRR and EMD phases, the systems engineer is responsible for developing or updating a plan for the management and mitigation of parts management issue, which includes the identification of the technical data needs to support mitigations. During the production and deployment phase, the systems engineer is further responsible for the identification of long-lead items and critical parts and materials and the mitigation of impacts on production and sustainment. During the operations and support (O&S) phase, the systems engineer is responsible for performing parts and DMSMS risk analysis in order to identify, prioritize, and mitigate any issues. In addition, the MCA chapter lists parts management as one of several specialty engineering disciplines. Specifically, parts management is described as a fundamental process that should be tailored to meet the needs of a program office, starting during early design to ensure that systems engineering and manufacturing objectives are met. The parts management process continues to be important through the O&S phase to reduce costs, enhance logistics readiness and interoperability, reduce acquisition lead-time, increase supportability and safety of systems, and enhance reliability and maintainability engineering.
MTA	There are parts management sections under specialty engineering, corresponding to rapid prototyping and rapid fielding. Program managers should implement parts management, as appropriate, during parts selection, parts redesign, and further address parts management during design reviews
UCA	There is a parts management section under specialty engineering. Program managers should implement parts management, as required, when parts require modification or the system will enter longer term sustainment.

A.2 Pertinent Guidance Related to the System Engineering Guidebook

Table 8. Location of Parts Management Content in Systems Engineering Guidebook

Location	Summary of Parts Management–Related Guidance Content
Section 2	• Under “System-Level Considerations,” systems and systems of systems are described as consisting “of parts, relationships, and a whole that is greater than the sum of its parts.” Systems engineers oversee the implementation of disciplined systems engineering processes and “the selection of qualified, trusted vendors for parts, materiel, and processes (for hardware and software).” • Under “Systems Engineering Role in Contracting,” a contractor Parts Management Plan and associated deliverables is listed as one type of typical content to appear in “Section H: Special Contract Requirements“ for a request for proposal.

Location	Summary of Parts Management–Related Guidance Content
Section 3	As part of a PDR, the evaluation of parts lists for compliance with the Parts Management Plan is listed as one type of criteria for consideration as part of the technical baseline documentation/digital artifacts (allocated).
Section 5	Under the discussion of the DMSMS design consideration, one of the practices listed to promote DMSMS resilience is the proactive assessment of parts obsolescence risk when selecting parts. The verification of the plans for the selection and application of parts and materials to minimize reliability risks is listed among reliability and maintainability activities during preliminary design. Furthermore, during detailed design, and production, reliability and maintainability activities include the verification that parts, materials, and processes meet system requirements. The latter activity for during design includes a reference to MIL-STD-1546, *Parts, Materials, and Processes Control Program for Space and Launch Vehicles*; MIL-STD-1547, *Electronic Parts, Materials, and Processes for Space and Launch Vehicles*; and MIL-STD-11991, *General Standard for Parts, Materials, and Processes*. Parts management and selection are also discussed for the purposes of standardization.

A.3 Pertinent Policy and Guidance Related to Systems Engineering

Table 9. Policy and Guidance Pertinent to Design Considerations for Systems Engineering

Design Consideration	Policy or Guidance	Document
Overarching	Policy	DoDI 5000.88, *Engineering of Defense Systems*, November 18, 2020.
	Guidance	*Engineering of Defense Systems Guidebook*, February 2022.
		Systems Engineering Guidebook, December 2021.
		Department of Defense Systems Engineering Plan Outline, Version 4.0, September 2021.
Manufacturing and Quality	Policy	DoDI 5000.93, *Use of Additive Manufacturing in DoD*, July 6, 2021.
	Guidance	*Early Engineering and Quality Engineering Guide*, July 2022.
		DoD Manufacturing and Quality Body of Knowledge (M&Q BoK), January 2021.
Reliability and Maintainability	Guidance	*DoD Reliability and Maintainability Engineering Management Body of Knowledge*, August 2018.
Standardization	Policy	DoDM 4120.24, *Defense Standardization Program (DSP) Procedures*, October 15, 2018.
Supportability	Guidance	*Product Support Manager Guidebook*, May 2022.
		Life Cycle Sustainment Plan: Sample Outline, Version 3.0, October 2022.
		Integrated Product Support Element Guidebook, March 2021.

A.4 Pertinent Policy and Guidance Related to System Security Engineering

Table 10. Policy and Guidance Pertinent to Design Considerations for System Security Engineering

Design Consideration	Policy or Guidance	Document
Assurance	Policy	DoDI 5200.xx, *Access to Assured Microelectronics* (Forthcoming).*
	Guidance	(Forthcoming)
Program Protection	Policy	DoDI 5200.39, *Critical Program Information (CPI) Identification and Protection Within Research, Development, Test, and Evaluation (RDT&E),* October 1, 2020.

Design Consideration	Policy or Guidance	Document
		DoDI 5200.44, *Protection of Mission Critical Functions to Achieve Trusted Systems and Networks*, October 15, 2018.
		DoDI 5000.83, *Technology and Program Protection to Maintain Technological Advantage*, May 21, 2021.
	Guidance	*Program Protection Plan Outline & Guidance*, Version 1.0, July 2011.
		Technology and Program Protection Guidebook, July 2022.
		Trusted Systems and Networks (TSN) Analysis, June 2014.
		Program Protection Plan Evaluation Criteria, Version 1.1, February 2014.
Anti-Tamper	Policy	DoD Directive 5200.47E, *Anti-Tamper*, December 22, 2020.
		DoDI 5200.39* and DoDI 5000.83.* [Full citations provided under Program Protection]
Cybersecurity	Policy	DoDI 5000.90, *Cybersecurity for Acquisition Decision Authorities and Program Managers*, December 31, 2020.
		DoDI 8500.01, *Cybersecurity*, October 7, 2019.
		DoDI 8510.01, *Risk Management Framework for DoD Systems*, July 19, 2022.
		System Protection—DoDI 5200.39.* and DoDI 5200.44.* [Full citations provided under Program Protection]
	Guidance	*DoD Program Manager's Guidebook for Integrating the Cybersecurity Risk Management Framework (RMF) into the System Acquisition Lifecycle*, Version 1, September 2015.

A.5 Pertinent Policy and Guidance Related to Supply Chain Risk Management

Table 11. Policy and Guidance Pertinent to Design Considerations for Supply Chain Risk Management

Design Consideration	Policy or Guidance	Document
Classical SCRM	Policy	DoD Directive 3000.16, *Vendor Threat Mitigation*, July 6, 2022.
		DoDI 4140.01, *DoD Supply Chain Materiel Management Policy*, March 6, 2019.
		DoDI 4160.67, *DoD Counterfeit Policy*, March 6, 2020.
		DoDI 4245.15, *Diminishing Manufacturing Sources and Material Shortages*, November 5, 2020.
		DoDM 4245.15, *Diminishing Manufacturing Sources and Material Shortages*, October 26, 2022.
		DoDI 5000.91, *Product Support Management for the Adaptive Acquisition Framework*, November 4, 2021.
		DoDM 4140.01, *DoD Supply Chain Materiel Management Procedures*: Vol. 3, *Materiel Sourcing*, August 26, 2022. Vol. 4, *Make and Maintain Materiel*, November 1, 2019.
	Guidance	[See Systems Engineering—Supportability guidance]

Appendix B. Parts Management Questions for System Engineering Technical Reviews, Independent Logistics Assessments, and Sustainment Reviews

Table 12 contains examples of questions that may be asked during the system engineering technical reviews (SETRs), independent logistics assessments (ILAs), and sustainment reviews throughout the acquisition life cycle. The questions correspond to plans or requirements associated with parts management processes. Answers to all applicable questions should be yes in order to move to the next phase of the life cycle.

The first five columns of Table 12 correspond to five of the SETRs as follows:

- System Requirements Review (SRR) where top-level requirements are understood.
- System Functional Review (SFR) where the functional baseline is established,
- PDR where the baseline is shown to meet the requirements and development is ready to begin detailed design.
- CDR where the design is stable and fabricating, integrating, and higher-level testing is about to start.
- Production Readiness Review (PRR) where the system is ready to begin low rate production.

ILAs occur at the following points in the life cycle of a system as shown in the next to last column of Table 12:

- Milestone (MS) B where a decision is made to begin detailed design.
- MS C where low rate production is approved.
- Full Rate Production (FRP) where an FRP decision is made.

Sustainment reviews occur at the following points in the life cycle of a system as shown in the last column of Table 12:

- At Initial Operating Capability (IOC) where sufficient assets have been fielded to operate the system within a unit; Sustainment reviews should occur at IOC and at least every five years after that.

Table 12 is written to reflect only the first time a question is posed. It is implied that program offices must continuously thereafter ensure the requirement is being adhered to.

Table 12. Examples of Questions to Be Addressed at Different Stages of the Acquisition Life Cycle

	SRR	SFR	PDR	CDR	PRR	MS B, MS C, and FRP	IOC & After
Government risk assessment							
	Has the program office begun a risk assessment to determine the appropriate level of parts management oversight?	Has the type and extent of program office parts selection oversight been determined?					
Resourcing government oversight							
		Have the required skillsets and numbers of FTEs to perform oversight been identified?	Have the required resources to perform parts management oversight been acquired?				
Contract requirements establishment							
		Have parts management contract requirements been drafted to correspond to the necessary level of oversight?	Have all parts management requirements been put on contract?		Are parts management contract requirements being updated as needed?		
Program office Parts Management Plan							
		Has a preliminary program office Parts Management Plan been developed?	Has the program office's Parts Management Plan been approved?		Is the program office Parts Management Plan being updated as needed?		
Contractor Parts Management Plan							
		Is a contractor Parts Management Plan required in the contract?	Has the program office approved the contractor Parts Management Plan?		Is the contractor Parts Management Plan being updated as needed?		

	SRR	SFR	PDR	CDR	PRR	MS B, MS C, and FRP	IOC & After
Lead free risk mitigation plan							
		Is a lead-free control requirement established in the contract?	Has a lead-free control plan been developed, implemented, and approved by the program office?				
Counterfeit risk mitigation plan							
		Is a counterfeit control requirement established in the contract?	Has a counterfeit control plan been developed, implemented, and approved by the program office?				
COTS management plan							
		Is a COTS management requirement established in the contract?	Has a COTS management plan been developed, implemented, and approved by the program office?				
Part selection and approval							
		Has the program office determined how it will verify that the contractor is following the processes in its approved Plan?	Has the program office verified that the contractor is following the processes in its Plan?				
			Has the program office verified that all design considerations are being taken into account during contractor parts selection?				
Subcontractor management							
		Have contractor flow down requirements been established?	Are requirements being flowed down correctly?		Are requirements being flowed down to new subcontractors?		

	SRR	SFR	PDR	CDR	PRR	MS B, MS C, and FRP	IOC & After
		Has the program office's role in overseeing subcontractors been established?	Is the program office carrying out its role?			Is the program office role being updated?	
Monitoring and record keeping							
		Does the contract specify that BOMs must be provided to the program office?	Is the program office reviewing BOMs (and updates to BOMs) to validate that parts meet their allocated and derived requirements?		Are BOM updates being received?		
		Does the program office Parts Management Plan include participation in program reviews and other on-site oversight?	Are program office parts management practitioners participating in program reviews and conducting other on-site analyses?				
		Have record keeping requirements for parts and parts management processes been established (what must be collected, and when)?	Are the appropriate data being collected, maintained, and analyzed?				
Exception reports							
			Have procedures for submitting and reviewing parts listed on exception reports been documented?	Are exception reports being analyzed?			
Part approval							
		Has responsibility been established for part approval?					
		Have data requirements been established for part approval?					

	SRR	SFR	PDR	CDR	PRR	MS B, MS C, and FRP	IOC & After
			Are part approval processes in place and being followed?		Are part approval processes being updated as needed?		
Triggering events							
			Are triggering events being identified, analyses being conducted to determine additional risk being imposed by triggering events, and changes being implemented to reduce that risk where needed?				

Appendix C. Considerations for Specifying Parts Requirements on Contract

Detailed parts selection requirements typically limit the selection of parts to a specific type, grade, or class. This is commonly accomplished by putting a document on contract that specifies selection requirements and describing the processes for doing this in the contractor Parts Management Plan. There are multiple mechanisms for specifying parts requirements and prohibitions.

C.1 Standards and Specifications

MIL-STDs are a common way to express part requirements. A MIL-STD is used to satisfy military-unique applications. There are five types of DoD standards: interface standards, design criteria standards, manufacturing process standards, standard practices, and test method standards.[76] Other types of documents serving similar functions include:

- MIL-HDBKs provide standard procedural, technical, engineering, or design information about the materiel, processes, practices, and methods covered by the DSP.[77]
- MIL-SPEC describe the essential technical requirements for military-unique materiel or substantially modified commercial items.[78]
- MIL-PRFs are performance specifications that state requirements in terms of the required results with criteria for verifying compliance, but without stating the methods for achieving the required results. A performance specification defines the functional requirements for the item, the operational environment, and interface and interchangeability characteristics,[79] Military Details are detailed specifications that identify design requirements, such as materials to be used, how a requirement is to be achieved, or how an item is to be fabricated or constructed. A specification that contains both performance and detail requirements is still considered a detail specification.[80]

The most commonly used MIL-STDs and similar documents for specifying detailed part selection requirements are listed below.

- MIL-STD-11991
- MDA-QS-003-PMAP-Rev C for missile defense[81]
- MIL-STD 882E for system safety[82]

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[76] MIL-STD-962D, *Defense Standards Format and Content*, August 1, 2003.

[77] Ibid.

[78] MIL-STD-961E, *Defense and Program-Unique Specifications Format and Content*, August 1, 2003.

[79] Ibid.

[80] Ibid.

[81] MDA-QS-003-PMAP-Rev C, Missile Defense Agency: Parts, Materials, and Processes Mission Assurance Plan, nd.

[82] MIL-STD-882E, *System Safety*, May 11, 2012.

- SMC-S-009 and SMC-S-010 for space and missile systems[83]
- NASA/TP—2003--212242.[84]

Industry standards may also establish detailed parts requirements. Many industry standards are referenced in the above list of documents. Commonly used industry standards include the following:

- EIA-STD-4899 for component management[85]
- IEC TS 62239-1 for component management[86]
- AIAA R-100A for component management[87]
- SAE AS5553 for counterfeit prevention[88]
- SAE AS6174 for counterfeit prevention[89]
- SAE AS12500 for corrosion prevention[90]
- SAE EIA933 for COTS management[91]
- SAE GEIA-STD-0005-1 for lead free control management[92]
- SAE GEIA-STD-0005-2 for tin whisker risk management[93]
- SAE AS8030 for electronic materials and processes[94]
- IPC J-STD-001 for electronic assembly[95]
- IPC-A-620 for cable and wire harnesses[96]
- SAE AMS7000 series for additive manufacturing.[97]

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[83] Space and Missile Systems Center Standard (SMC-S)-009, *Parts, Materials, and Processes Control Program for Space Vehicles*, April 12, 2013, and SMC-S-010, *Technical Requirements for Electronic Parts, Materials and Processes Used in Space Vehicles*, April 12, 2013.

[84] National Aeronautics and Space Administration, Goddard Space Flight Center, NASA/TP—2002—212242, EEE-INST-002: Instructions for EEE Parts Selection, Screening, Qualification, and Derating, April 2008, incorporated addendum 1.

[85] EIA-STD-4899C, *Requirements for an Electronic Components Management Plan*, May 9, 2017.

[86] IEC 62239-1:2018, *Process management for avionics—Management plan—Part 1: Preparation and maintenance of an electronic components management plan*, September 24, 2018.

[87] AIAA R-100A:2018, *Recommended Practice: Recommended Practice for Parts Management*.

[88] SAE AS5553D, *Electronical, Electronic, and Electromechanical (EEE) Parts: Avoidance, Detection, Mitigation, and Disposition*, April 14, 2022.

[89] SAE AS6174A, *Counterfeit Materiel; Assuring Acquisition of Authentic and Conforming Materiel*, July 29, 2014.

[90] SAE AS12500, *Corrosion Prevention and Deterioration Control in Electronic Components and Assemblies*, April 24, 2018.

[91] SAE EIA933C, *Requirements for a COTS Assembly Management Plan*, August 3, 2020.

[92] SAE GEIA-STD-0005-1A, *Performance Standard for Aerospace and High Performance Electronic Systems Containing Lead-free Solder*, March 2012.

[93] SAE GEIA-STD-0005-2A, *Standard for Mitigating the Effects of Tin Whiskers in Aerospace and High Performance Electronic Systems*, May 2012.

[94] SAE AS8030, *Requirements for an Electronic Materials and Processes Management Plan*, August 16, 2018.

[95] IPC J-STD-001H, *Requirements for Soldered Electrical and Electronic Assemblies*, September 2020.

[96] IPC/WHMA-A-620E, *Requirements and Acceptance for Cable and Wire Harness Assemblies*, October 2022.

[97] SAE ASM7000A, *Laser-Powder Bed Fusion (L-PBF) Produced Parts, Nickel Alloy, Corrosion- and Heat-Resistant, 62Ni - 21.5Cr - 9.0Mo - 3.65Nb Stress Relieved, Hot Isostatic Pressed and Solution Annealed*, May 16, 2022.

C.2 Qualified Manufacturers List and Qualified Products List

Another way to specify part requirements is through the mandated use of products found on a Qualified Manufacturers List (QML) or a QPL. The parts listed in either a QML or a QPL are ones where there is a MIL-SPEC that invokes a QPL or QML requirement.

QMLs and QPLs provide lists of parts that have successfully met the qualification and testing requirements in the associated specification and are approved for use in DoD systems. More formally, a QML is a list of "qualified processes and materials at each facility that have been successfully subjected to a defined set of qualification and periodic tests using processes and worst case designs or materials to verify the end product's design, performance, quality, and reliability meet all the applicable specification requirements."[98] A QPL is a list of "products or families of products that have successfully completed the formal qualification process (including all specified periodic tests) that examines, tests, and verifies that a specific product design meets all the applicable specification requirements."[99] The DSPO is responsible for QML and QPL policy and procedures.

"Qualification is a process in advance of, and independent of, an acquisition by which a manufacturer's capabilities or a manufacturer's or distributor's products are examined, tested, and approved to be in conformance with specification requirements, …."[100] The preparing activity for a MIL-SPEC is responsible for qualification.

DSPO is responsible for the Policy/Procedures but the preparing/qualifying activity is responsible for qualification of the items under their purview.

There are three ways to mandate the use of QML or QPL parts.

- Specify that a part shall meet the requirements of a MIL-SPEC invoking a QPL or QML.
- Specify a mandatory order of precedence for selecting parts in the contract and have all MIL-SPEC qualified parts as the highest preference. When this is done, a QML or QPL part that meets the requirements should be selected. The selection is not guaranteed however because there may be a justification for selecting another part, e.g., the form or fit of the MIL-SPEC part may not be acceptable. This type of contract requirement is not discussed in the SD-26.
- Require an order of precedence in the processes described in the contractor Parts Management Plan. In this situation, the Plan should not be approved by the government without an acceptable order of precedence.

C.3 Preferred Parts List

Although the same part can be on a QPL and a PPL, they are entirely different. There are two types of PPLs. The first is a program office–approved PPL. Inclusion of a part on this PPL typically implies that the program office has agreed in advance that parts selected from the list will automatically be approved by any program office part selection approval process established in the contract or in the contractor Parts Management Plan. Typically, parts included in a program office–approved PPL will have been successfully used in similar applications. The program office should also approve any changes to the PPL. The process to make changes should be in the contractor Parts Management Plan.

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[98] SD-6, *Provisions Governing Qualification: Qualified Products Lists and Qualified Manufacturers Lists*, DSPO, August 2019.

[99] Ibid.

[100] Ibid.

The second type of PPL is a contractor-chosen PPL. That is a commercial company artifact that identifies the parts to be given the highest selection priority typically through a computer-aided design tool when developing a product. Parts are chosen for a PPL based on factors such as usage, sources, community acceptance, performance, availability, technology, cost, and lead time. There are many reasons for an office's part selection value proposition. To satisfy the requirements of a specific acquisition, it may be desirable to tailor the selection of parts from the PPL. This can be accomplished by limiting the selection of parts to a specific type, grade, or class as discussed above.

C.4 Part Prohibitions

Just as certain part requirements may be specified, part prohibitions may also be established. Appendix C of MIL-STD 11991 contains prohibited parts, materials, and processes. The listed parts, materials, and processes "are considered to be reliability suspect, have limited application, involve restricted or special controls, or are otherwise unacceptable for use in aerospace and defense electronic hardware and associated mechanical hardware."[101] These parts, materials, and processes should not be used without advanced and explicit government approval. The Parts, Materials, and Processes Mission Assurance Plan (PMAP) similarly includes parts, material, and process prohibitions throughout its requirements section. PMAP Appendix E contains restricted parts, materials, and processes requiring special consideration before use.

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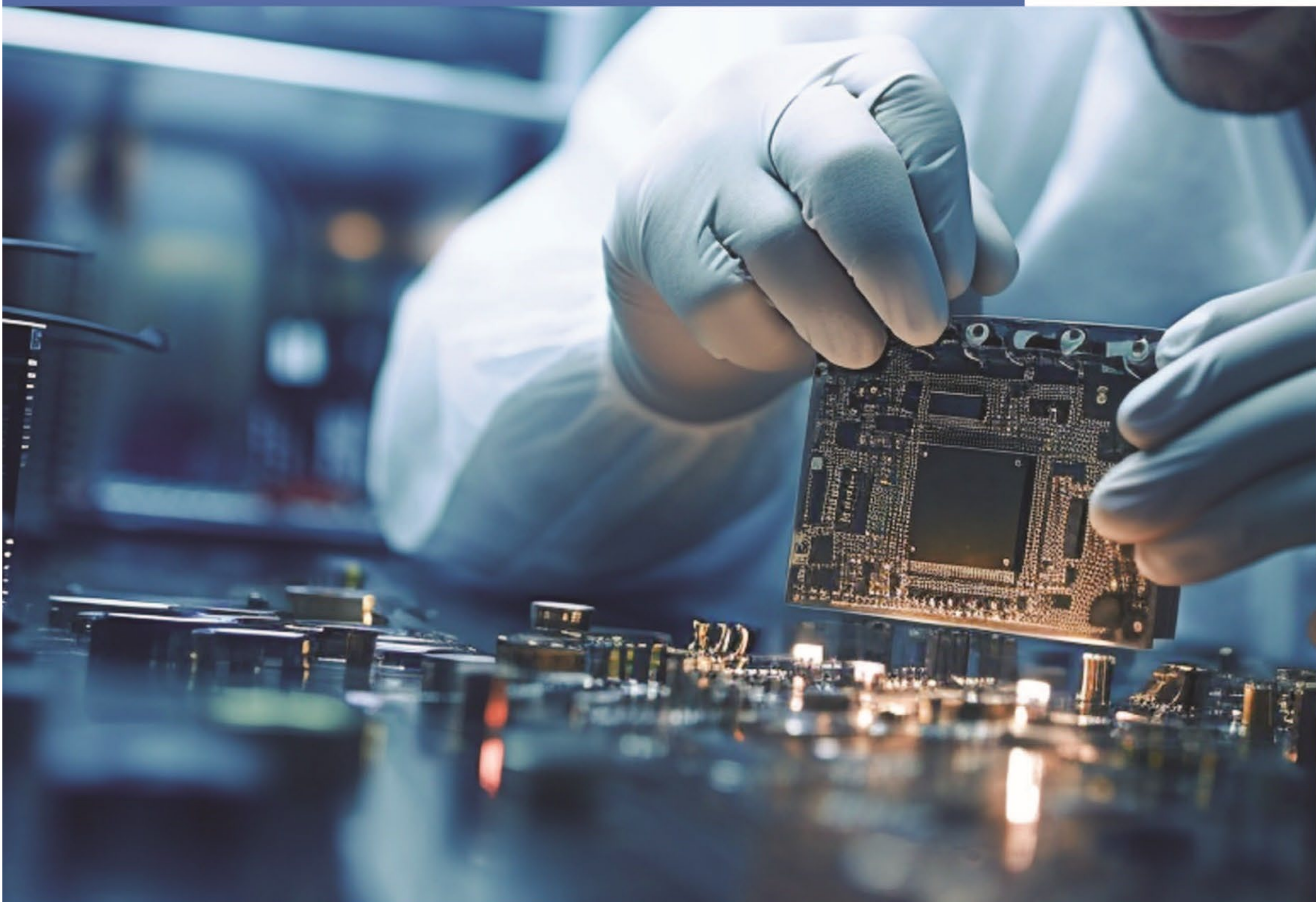
[101] See MIL-STD-11991B, *General Standard for Parts, Materials, and Processes*, October 3, 2023.

Appendix D. Abbreviations

AAF	Adaptive Acquisition Framework
ACAT	Acquisition Category
Ao	operational availability
BOM	bill of material
CAC	common access card
CAGE	commercial and government entity
CDCA	Current Document Control Authority
CDR	critical design review
CFOM	cyber figure of merit
COTS	commercial-off-the-shelf
CPI	critical program information
CPSSEP	Cyber-Physical System Security Engineering Plan
DAU	Defense Acquisition University
DCMA	Defense Contract Management Agency
DLA	Defense Logistics Agency
DMSMS	diminishing manufacturing sources and material shortages
DoD	Department of Defense
DoDI	Department of Defense Instruction
DoDM	Department of Defense Manual
DSP	Defense Standardization Program
DSPO	Defense Standardization Program Office
ECP	engineering change proposal
EEE	Electronical, Electronic, and Electromechanical
EMD	Engineering and Manufacturing Development
FLIS	Federal Logistics Information System
FOCI	foreign ownership, control, or influence
FRP	Full Rate Production
FTE	full-time equivalent
GFP	government furnished property
GIDEP	Government-Industry Data Exchange Program
ICT	information communication technology
IEC	International Electrotechnical Commission
ILA	independent logistics assessment
IOC	Initial Operating Capability
IPC	Initial Production Check
IPT	Integrated Product Team

IR	item reduction
KSA	knowledge, skill, and ability
LCSP	Life Cycle Sustainment Plan
L-PBF	Laser-Powder Bed Fusion
M&Q BoK	Manufacturing and Quality Body of Knowledge
MCA	Major Capability Acquisition
MDA	Missile Defense Agency
MIL-HDBK	Military Handbook
MIL-PRF	Military Performance Specification
MIL-SPEC	Military Specification
MIL-STD	Military Standard
MS	milestone
MTA	Middle Tier Acquisition
MTTF	mean time to failure
NAS	National Air Standard
NDI	non-developmental item
NIST	National Institute of Standards and Technology
NSN	national stock number
O&S	operations and support
OCM	original component manufacturer
OEM	original equipment manufacturer
PCN	product change notice
PDR	preliminary design review
PMAP	Parts, Materials, and Processes Mission Assurance Plan
PPL	preferred parts list
PPP	program protection plan
PRR	Production Readiness Review
QML	Qualified Manufacturers List
QPL	Qualified Products List
RDT&E	Research, Development, Test, and Evaluation
RMF	Risk Management Framework
SCRM	supply chain risk management
SD	Standardization Document
SEP	Systems Engineering Plan
SETA	Systems Engineering and Technical Assistance
SETR	system engineering technical review
SFR	System Functional Review
SMC-S	Space and Missile Systems Center Standard
SME	subject matter expert

SRR	System Requirements Review
SSS	Systems Security Symposium
TDP	technical data package
TMRR	Technology Maturation and Risk Reduction
TSN	Trusted Systems and Networks
UCA	Urgent Capability Acquisition
WG	Working Group
WSIT	Weapon System Impact Tool



DEFENSE STANDARDIZATION PROGRAM OFFICE
8725 John J. Kingman Road, Stop 5100
Fort Belvoir, VA 22060-6220
(571) 767-6888
dsp.dla.mil