Legacy Sustainment: Innovation For The Next Generation Of DMSMS

Authors: Ethan Plotkin and Kaye Porter GDCA, Inc., Livermore, CA

Abstract

When programs fail to actively and consistently address obsolescence risks throughout a program's life cycle, it affects the availability of critical weapons systems and risks the ongoing safety of our warfighters.

The SD-22 guidebook (Diminishing Manufacturing Sources and Materials Shortages: A Guidebook of Best Practices for Implementing a Robust DMSMS Management Program) directs program managers to provide a proactive management process whereby an ongoing diminishing manufacturing sources and materials shortages (DMSMS) impact assessment can be performed to "examine the potential effects that a DMSMS issue, at any level of a system, may have on cost, schedule, readiness, and availability."

Techniques outlined in SD-22 represent traditional best practices; however, they often fall short in effectively and efficiently support aging programs that require ongoing access to critical IP. When it is understood that traditional obsolescence management itself often starts too late in a program's lifecycle, we see the need to address ongoing risks from a different angle: to accurately understand our DMSMS and obsolescence risk with the goal of planning for legacy and total lifecycle sustainment—as opposed to continuously reacting to obsolescence.

The Waterfall Effect: COTS and DMSMS

All participants in the acquisition system shall recognize the reality of fiscal constraints. They shall view cost as an independent variable, and . . . shall plan programs based on realistic projections of the dollars and manpower likely to be available in future years.

From the SD-22 DMSMS guidebook, p. #15

DMSMS, as defined in the SD-22, is "the loss, or impending loss, of manufacturers or suppliers of items, or raw materials, or software." Techniques outlined by the SD-22 represent traditional best practices, which are regularly used to try to manage electronics obsolescence within defense programs. Failure to proactively and consistently address obsolescence risks throughout a program's lifecycle costs programs millions of dollars, affects the availability of critical weapons systems, and risks the ongoing safety of our warfighters.

Evolving technology and obsolescence, low-volume embedded market demand, and regulations related to available materials (such as counterfeit avoidance DFARS) that affect the supply chain as a whole are some of the many factors that drive DMSMS

Component obsolescence is a double-edged sword; it is beneficial because it is evidence of the relentless progress of technology, but detrimental because market demands force industry supply chain players to cut back their support for mature technologies that have low or sporadic demand. To stay competitive in a highly demanding market, component manufacturers end-of-life (EOL) their products, which forces computing suppliers to EOL their products, which forces equipment suppliers and engineers to scramble for ways to solve sustainment problems and stretch out the life of their older system designs. This waterfall effect represents the way the industry has reacted to obsolescence as it rolls through the supply chain, creating a sustainment gap between new technology and older technology designs.

Customers of discontinued or "obsolete" electronics components and commercial circuit-card assemblies then find it difficult to obtain reliable support for their legacy applications. Lack of visibility of product change notices (PCN), EOL, last-time-buy notices, inability to forecast remaining life cycle quantities, and increased exposure to counterfeit components are nothing new to the defense industry. According to Rory King of IHS, PCNs and EOL notices have seen a 40 percent growth rate (compounded) in the past ten years. In the face of this rapidly increasing EOL and ever-increasing counterfeit risk, systems providers find themselves requiring sustainment that extends far beyond traditional best-practice logistics and engineering tactics.

To sustain legacy applications, today's DMSMS teams must fundamentally shift their perspective from obsolescence management to legacy sustainment. This shift toward proactivity will serve as the basis for tailoring a forward-thinking, holistic support solution for any program, regardless of its stage in its lifecycle. This shift will result in an integrated process and a supply chain poised to support products that have transitioned beyond their active life stage and into the legacy stage of their lives.

Obsolescence: Management vs. Mitigation

"Cost impacts may be experienced in any stage of the life cycle. The impact is measured as (1) the additional cost that must be paid to resolve the issue, (2) the change in support costs (it will cost the program less if reliability is improved), and (3) the difference in the cost of parts before and after resolution.

From SD-22 DMSMS guidebook p. #84-85

DMSMS is typically the result of the transition to commercial off-the-shelf products (COTS) and the waterfall effect. When the defense community began to realize both the benefits (lower costs) and resulting effects (shorter life cycles and ongoing effects from disruptive technology), it quickly realized that it needed a way to manage the resulting unavailability of both products and materials. As a result, the SD-22 was developed to provide guidance on how defense programs could manage obsolescence. However, even with the direction provided by the SD-22, DMSMS teams regularly battle successive and never-ending "obsolescence storms," such as:

- Modernization schedule delays,
- Shifting government policies,
- Declining sustainment funding,
- Unexpected demand from foreign sales, and
- Counterfeit problems throughout the supply chain.

Instead of being able to truly focus on the real objective—ensuring system availability and affordability—these teams are forced to reactively address continual obsolescence events. They are stuck in the never-ending cycle of trying to 'catch the tail' of obsolescence before their programs and systems are left behind or become too expensive to support.

Recently, the threat of counterfeit components has dominated the DMSMS conversation and has initiated a generation of legislation to ensure quality components. Significant time and money are spent to guarantee the integrity of parts the defense industry has been forced to buy from non-franchised distributors. However, protecting a system requires more than merely securing components; it requires an integrated solution shared across the supply chain and with all services.

Component verification alone will not ensure the sustainability of an old application system design. Traditional obsolescence management does not address total life cycle sustainment needs. Anyone responsible for sustaining legacy systems knows that after EOL, the options for mitigating obsolescence and counterfeit risk diminish over time, even as the risk and cost of those issues rises. Without a clear way of assessing both demand and risk, those in charge of defense programs find themselves struggling with:

- Inaccurate forecasts,
- Uncertain access to critical components, and
- Limited visibility of obsolescence risks and issues throughout a product's total life cycle.

In a climate of performance based logistics (PBLs), budget cuts, sequestration, COTS obsolescence, and increased counterfeit risks, obsolescence management needs an innovative refresh just as much as many of our defense systems do.

Legacy: Innovation for the Next Generation of DMSMS

Proactively take timely and effective actions to identify and minimize the DMSMS impact on DoD acquisition and logistics support efforts.

SD-22 DMSMS guidebook

No system is immune to DMSMS issues. As equipment becomes unavailable due to extended lifecycle and a shrinking supply of spare boards, the warfighter's ability to respond to critical situations diminishes. The Defense MicroElectronics Activity (DMEA) currently estimates that a single incident of obsolescence can run up to $2.4 million and 64 weeks to resolve. Some programs see up to 70 percent of their critical components become obsolete during the design phase. DMSMS teams are pressed to be proactive; however, program managers (PMs), engineers, and lifecycle logisticians (including supply chain managers and inventory managers) typically manage the problem only after an EOL event has occurred. As a result, few teams have the latitude to effectively head off obsolescence risk and EOL problems.

While embedded board and component manufacturers try to consider the long-lasting needs of defense programs, the only solution they can usually offer is a form-fit-function upgrade or replacement. However, even moderate changes can require extensive testing to verify that the substitution will actually respond in the same way as the original part and not involve recertification and unintended consequences.

In most cases, this situation forces program teams to scramble to assess long-term requirements and find the funding for a lifetime buy, or they are forced to work with a volatile supply chain that leaves them vulnerable to increased counterfeit risk and rapidly changing costs. Logistics teams are forced to manage increasing lead times as spares dwindle and repair/replacement demands stretch out. Understanding how to assess ongoing obsolescence risk is critical to ensuring legacy. If we want to ensure the legacy of critical products that are at the tail end of their life cycle's active phase, we must accept that we cannot meet the needs of our warfighters if we wait for EOL before taking action.

Proactive Obsolescence Risk Assessment

Proactively consider DMSMS through[out] a system's life cycle by anticipating potential DMSMS occurrences and taking appropriate logistics, acquisition, and budgeting steps to prevent DMSMS from adversely affecting readiness or total ownership cost.

SD-22 DMSMS guidebook

Obsolescence is not an event that happens once in an application's life cycle; it is a slow, progressive process that happens throughout its life cycle. Supporting an application through its EOLphase requires ongoing planning and life cycle analysis to determine tasks, accountability, procedures, and management schedules. At first glance, these activities may appear at odds with current obsolescence management and DMSMS tactics. However, they are wholly consistent with legacy sustainment strategies.

As programs age, solutions change and we need to plan sustainment activities before parts run out and the warfighter faces the risk of equipment unavailable due to funding challenges and obsolescence. While obsolescence management traditionally starts after products have matured, examining a program from a total life cycle, from a legacy sustainment perspective, means that ensuring legacy begins up-front in the design and development phase of the life cycle. A critical piece of this planning is having an ongoing legacy sustainment plan that follows the application as products transition from active to legacy.

Rather than waiting for EOL-triggered phase-outs and last time buys (LTBs), Proactive Legacy Management (PLM+™) establishes a framework to track the "waterfall" and to take advantage of available information such as total system demand, parts availability, commonly used parts, amount of risk to be managed (e.g., the criticality of the system), and the number of secure supply sources. PMs, engineers, and life cycle logisticians (including supply chain managers and inventory managers) in collaboration with contractors can use this framework to gain the following benefits:

- **Technical data**—Collaborating with original equipment manufacturers (OEMs), original component manufacturers (OCMs), and legacy suppliers across the supply chain to maintain access to critical COTS architectures
- **DMSMS risks visibility**—Tracking aging systems, subsystems, and the COTS and custom designs within them to identify risks and to determine the available options at each stage of a product's life
- **Predictive funding requests**—Using ongoing assessment of product demand and life cycle status to plan upcoming strategic maintenance schedules and any necessary sustainment engineering

Projects with legacy sustainment objectives woven throughout will have more access to increased timely and lower-cost solutions, which ensures that—should a strategic refresh become necessary—upgrade expectations have already been planned and managed.

When programs fail to proactively and consistently address obsolescence risks throughout a program's life cycle, it affects the availability of critical weapons systems and jeopardizes the ongoing safety of our warfighters.

Techniques outlined by the SD-22 represent traditional best practices; however, without being able to address ongoing risks with the goal of planning for legacy, current obsolescence management tools regularly fall short when trying to manage electronics DMSMS.

About GDCA

Over its thirty years in business, GDCA has worked with government programs, prime contractors, and supply chain OEMs to optimize business practices needed to create a second source of supply (SSOS) for circuit card assemblies (CCAs) that have sustainment issues due to component obsolescence, age, or decreased demand.

SSOS works by reengineering the manufacturing capability for obsolete commercial off-the-shelf (COTS) CCAs and implementing program and sustainment plans to solve DMSMS problems for embedded board-level products that can no longer be supported by their OEMs. GDCA ensures these older products remain available to meet requirements at a knowable cost for as long as they are needed—whether for two, ten, or more than twenty years.

We firmly believe that collaboration and transparency help us bring together the industry's best thinkers who are a critical part of tailoring the necessary custom solutions to meet customer needs. GDCA is driven by the commitment to make embedded obsolescence a thing of the past.

For more information, please contact info@gdca.com.