Beyond Reactive Thinking – We Should be Developing Pro-Active Approaches to Obsolescence Management Too!

Peter Sandborn
University of Maryland

Most of the emphasis associated with methodology, tool and database development targeted at the management of electronic part obsolescence has been focused on accurately tracking and managing the availability of parts, forecasting the risk of parts becoming obsolete, and enabling the application of mitigation approaches when parts do become obsolete. In addition, the majority of the funding in the obsolescence area (even that associated with "R&D") is focused on minimizing the cost of obsolescence mitigation, i.e., minimizing the cost of resolving the problem after it has occurred by building methodologies and tools that optimize the *firefight*.

While there is unquestionable merit in devoting resources to optimizing the *reactive* management of obsolescence, and it does save sustainment dollars, ultimately much larger savings may be possible if methods targeted at *pro-active* design and life cycle planning of systems could be successfully developed and applied. Methodologies are needed that address how to optimally design a system in order to minimize the cost of concurrently managing both inevitable obsolescence problems and technology insertion. If information regarding the expected production lifetimes of parts (with appropriate uncertainties considered) is available during a system's design phase, then more strategic pro-active approaches that enable the estimation of lifetime sustainment costs should be possible, and even with data that is incomplete and/or uncertain, the opportunity for sustainment cost savings is still potentially significant with the application of the appropriate decision making methods.

One methodology that is being developed focuses on the question: if a forecast of parts obsolescence can be obtained and if a roadmap of *value* attributes for the product over time is available, can optimum redesign strategies be developed for the product over the product's overall life cycle? The methodology called MOCA (Mitigation of Obsolescence Cost Analysis) [1] developed by CALCE at the University of Maryland as a part of the Air Force Electronic Part Obsolescence Initiative determines the part obsolescence impact on life cycle sustainment costs for long field life electronic systems based on future production projections, maintenance requirements and part obsolescence forecasts. Based on a detailed cost analysis, MOCA determines the optimum refresh plan during the field-support-life of the product. The design refresh plan consists of the number of design refresh activities, their content and respective calendar dates that minimize the life cycle sustainment cost of the product. The MOCA methodology has been demonstrated in pilot projects with Honeywell, Northrop Grumman and Lockheed Martin.

The MOCA methodology initially targets technology sustainment, i.e., maintaining a static functional capability, but what about evolving requirements and technologies? Extensions to the MOCA methodology that expand the design refresh value proposition to include more than obsolescence effects are being developed. The extensions to

MOCA are moving it in the direction of enabling optimum technology insertion into systems based on a value proposition that includes performance, reliability, cost and elements of a conceptual assessment criteria called *viability* [2]. Viability is a measure of the producibility, supportability, and evolvability of a system. Ultimately, the value proposition and viability must consider more than just hardware, in addition, it must consider these same or similar 'ility' elements for software, information and intellectual property.

There are several real payoffs from pro-active life cycle planning that reactive optimization will never be able to provide. Pro-active treatment of electronic part obsolescence has the potential to provide the program manager with the ability to predict as early as possible (while the input data is uncertain) how to best design and plan for system sustainment:

- more accurate allocation of budget earlier in program development phases
- more accurate guidelines for how systems are modified at design refreshes
- improved operational availability
- enables broader impacts to be considered when mitigation approach decisions are made
- enables the opportunity for shared solutions across multiple systems and applications.
- improved capability to execute the performance improvement roadmap (i.e., with the optimum balance between mission needs and cost).

Realizing this payoff however requires the incorporation of cutting edge decision process approaches (decision making under uncertainty), design optimization, product planning, and data fusion capabilities to bear on this problem.

For more information on the MOCA tool and pro-active life cycle planning applied to systems subject to technology obsolescence, contact Peter Sandborn, CALCE Electronic Products and Systems Center, University of Maryland, at (301) 405-3167 or by email at sandborn@calce.umd.edu.

References

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2. P. Sandborn, T. Herald, J. Houston, and P. Singh, "Optimum Technology Insertion into Systems Based on the Assessment of Viability," *IEEE Trans. on Components and Packaging Technologies*, Vol. 26, No. 4, pp. 734-738, December 2003.