Designing for forward and backward compatibility is key to managing obsolescence

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All industries struggle with obsolescence, but the Military and Defense community is the most affected to be able accept new designs for COTS products.

When a component or technology is forecast to go out of manufacture; technology suppliers typically provide ample notice to customers relative to the date the item will no longer be available. Company management must be made aware of these situations and a plan to mitigate the event must be developed. Plans and development schedules must take into account the design cycle time and the date of unavailability of the item.

If there are no direct replacements for a particular item, the solution is to design out the obsolete item. In this case, notify customers of the situation and provide them the opportunity to purchase the old design. Provide customers a specific date the old design will no longer be available. Also, provide the customer with a schedule for when prototypes will be available for testing and a scheduled production release. Every customer will have a different solution; few solutions accept a redesign with open arms.

This is the nature of COTS technology; unfortunately it always causes customer problems. To mitigate customer problems, goals should include designing a new product that is forward and backward compatible in performance, has the same physical size and the same connector interfaces as the design going obsolete. Not all, if any of these design goals may be achievable when addressing obsolescence.

To replace obsolescence, a set of systematic evaluation, design, and review processes must be generated and implemented. Design standards and practices should be continuously evolving; having the goal to meet performance requirements, provide a long product life cycle, reduce design cycle time, and improve manufacturability and testability, to name a few.

The use of robust design processes is well suited to meet these objectives. Design and develop procedures and processes are complex and must establish design requirements for, or to meet the following:

- Market requirements
- Performance specifications
- Design process documentation and control
- Regulatory requirements
- Thermal performance
- Environmental performance and qualification
- Hardware and software qualification
- Design reviews
- Material and manufacturing cost
- Mechanical design including geometric dimensioning and tolerances
- Tooling
- Design for mechanical assembly
- Printed circuit board design and review criteria
- Component selection and analysis
- Component footprints, orientation, and placement
- Printed circuit board assembly manufacturability
- Printed circuit board assembly design for test
- Systems test
- Packaging

Company management has responsibility to manage cost, schedule and performance requirements of all design efforts. The development and management of budgets, activity schedules and design verification is mandatory for successful design processes.

Design cycle time can be reduced and on time release can be improved by implementing Figure of Merit and Dynamic Cycle Time reduction techniques.

Although not an approach to be taken without adequate customer notification, COTS suppliers can manage obsolescence by forcing new technology adoption. Even with advanced notice and information, many customers do not plan for the loss of supply of products affected by obsolescence.

Examples of customer responses include:

“No, we won’t allow it.”
“Buy all the items going end of life and stock them at your expense for us.”
“Buy all the items going end of life, build completed boards and systems and stock them for us at your expense.”
“Buy the quantity of items going end of life we need for our program and stock them at your expense for us.”

“Buy the quantity of items going end of life we need for our program, build boards and systems and stock them at your expense for us.”
“Why can’t you control the supplier?”

Obviously, these responses are from customers who have not planned for the loss of supply.

COTS product and system suppliers are faced with the obsolescence dilemma every day. Beyond advance notice and specific dates of availability, methods used to mitigate customer impact include the purchase of the technology going end of life based on historical usage, forecast demand and customer input.

Unfortunately, from experience, many customers are unable or unwilling to provide a forecast for future demand. In addition, few customers are willing to buy components and associated products that have items going end of life.

Nonetheless, making new design prototypes available for test and evaluation by customers at specified dates will afford them the opportunity to integrate the new design into their products and systems. The time required to evaluate the new design is dependent on the magnitude of design and configuration changes.

Customers who work with suppliers on obsolescence issue will be ahead of the curve, those who do not will be will have a negative impact. Ultimately, when supply is gone, it is gone and customers will be forced to adopt the new technology.

New designs cost money. Who pays for the new design? The COTS supplier does in most cases. The decision to start a new design to replace obsolete technology is one of economics. If development costs are not supported by an adequate ROI (Return on Investment) a supplier may decide to discontinue the product or system entirely.

Consider the following example:

A major FPGA supplier announces the end of life of an aging FPGA. This FPGA is used by a COTS supplier. The COTS supplier Engineering department develops a plan, including cost, schedule and performance elements to replace the FPGA. The cost of the design is determined to be $2 Million Dollars.

The COTS supplier Sales and Marketing departments determine the total demand for the product to be $2 Million Dollars the first year after the new product is released, $3 Million Dollars in the second year and $4 Million dollars in

year three. Sales in year 4 are forecast to be $3 Million Dollars and a decline in the years thereafter.

The COTS supplier Operations department determines the total cost of goods sold of the product to be 80% of the sales price.

The ROI is below:

	Sales	Cost of Goods	Profit	Cumulative Profit	ROI
Year 1	$ 2,000,000	$ 1,600,000	$ 400,000	$ 400,000	20%
Year 2	$ 3,000,000	$ 2,400,000	$ 600,000	$ 1,000,000	50%
Year 3	$ 4,000,000	$ 3,200,000	$ 800,000	$ 1,800,000	90%
Year 4	$ 4,000,000	$ 3,200,000	$ 800,000	$ 2,600,000	130%

NRE Cost	$ 2,000,000

In this example, the ROI is over three years. Because of the unacceptable ROI, Executive Management should not approve the design. If the ROI of a development is two years or less, designing out obsolescence has a chance.

Development costs must be supported by an appropriate ROI and are amortized as part of cost of goods sold.

COTS obsolescence is increasingly migrating to the adoption of platform architecture but not necessarily in legacy configurations. As older systems are not supported, or available, military PEO's and Contracting Officers are looking to COTS technology for systems emulation through hardware and software. Recently, legacy system emulation and data translation is being driven to be a complete software simulation running on new generation servers.

Obsolescence in COS technology is not slowing down; it is speeding up. COTS suppliers in the mainstream can be proactive to address its impact while supporting customers and the Military and Defense Industry.