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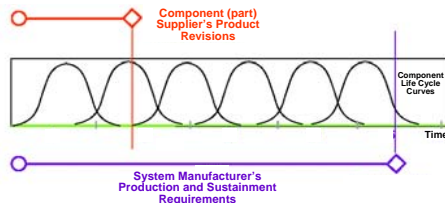
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## Technology Obsolescence

Obsolescence is defined as the loss or impending loss of original manufacturers of items or suppliers of items or raw materials. It is also known as DMSMS (Diminishing Manufacturing Sources and Material Shortages).

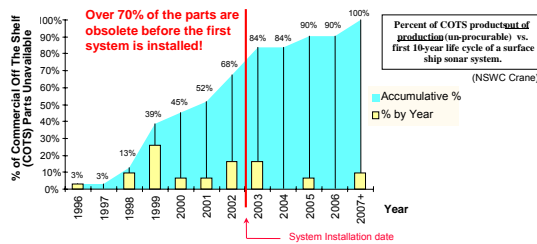
Obsolescence occurs because of a life cycle mismatch between systems and the components that they are composed of.



- Technology obsolescence impacts product sectors that do not have control over key portions of their supply chain.
- Technology obsolescence is a significant contributor to the high sustainment costs of complex long field life systems.
- As sustainment-dominated systems are forced to use more COTS (Commercial Off the Shelf) technology, obsolescence problems become more significant.

## The Electronic Part Obsolescence Problem

No technology typifies technology obsolescence problems more clearly than electronic parts.



"Given the current trend for 2003, industry experts estimate over 200,000 components from over 100 manufacturers will be obsolete by the end of 2003."  
"Obsolescence policy gains period of grace."  
<http://www.electronicstalk.com/news/text489.html>, August 19, 2003.

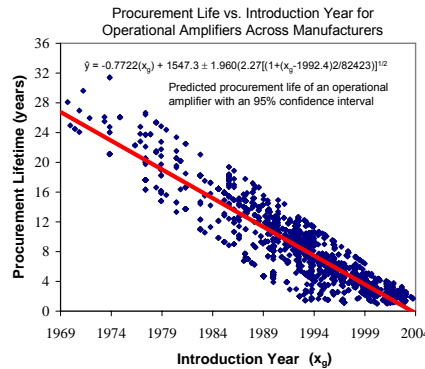
"Current estimated cost to the DoD of managing and mitigating electronic part obsolescence is 10 billion dollars/year."

Keynote address at 2006 DoD DMSMS Conf, July 2006  
Brig. General Eugene Payne, Commanding General, 4th Marine Logistics Group

## Forecasting Obsolescence

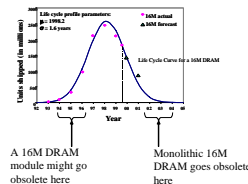
Part obsolescence dates (the date on which the part is no longer procurable from its original source) are the most important inputs to all forms of proactive obsolescence management.

**Part Obsolescence:** The life cycle curves of specific electronic parts can be predicted from historical market data.



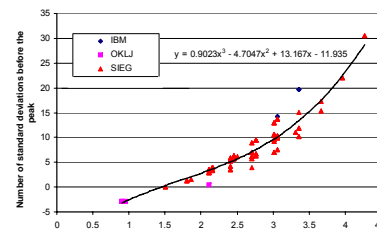
- Procurement life is the length of time between market introduction and market withdrawal by the original manufacturer
- Operational amplifier procurement lives have been growing shorter
- 2,000 data points from 7 manufacturers of operational amplifiers

**Module Obsolescence:** The obsolescence of memory modules is not dictated by the obsolescence of the memory chips that are embedded within them. Instead, obsolescence of memory modules is related to the beginning of availability of monolithic replacements for identical amounts of memory.



Data mined data mapping for DRAM memory modules.

M = module memory size in MB



$$\text{DRAM Memory Module Obsolescence Date Forecast} = 1991.8M^{0.0011} - [0.9023x^3 - 4.7047x^2 + 13.167x - 11.935](3.1M^{0.23})$$

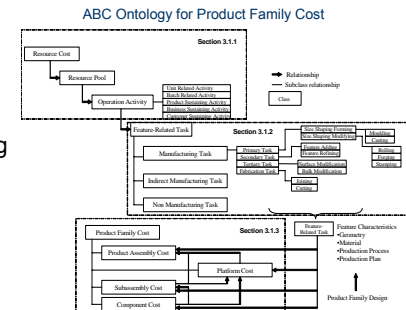
Peak sales date of monolithic DRAM      Standard deviation in sales data for the monolithic DRAM

## Enabling Material Risk Index Formation

Material Risk Indices (MRIs) are used to combine the risk prediction from obsolescence forecasting with organization-specific usage and supply chain knowledge in order to estimate the magnitude of sustainment dollars put at risk within a customer's organization by a part's obsolescence.

MRIs catalog replaceable subsystems by functionality (e.g., memory board, processor board, etc.), each cataloged subsystem is characterized by a profile that includes a set of time-dependent obsolescence risk impacts and an action level that defines the activities associated with design refreshment in the time period. The obsolescence risk in a particular period is translated into the fraction of subsystems of a certain type that require refreshment in the period.

**Activity-Based Cost Model:** The cost of refreshment in the period is computed with an activity-based cost model. Summing all the refresh costs over all the subsystems provides an estimate of the sustainment cost in the period.



As shown below, a product family can be represented by items and assembly relationships across products. Items become features, components, subassemblies, and assemblies. Both items and assembly relationships have cost properties that are useful to represent their feature-related tasks and estimate their costs. A web-based query search engine aides collaborative distributed investigations and design decisions.

