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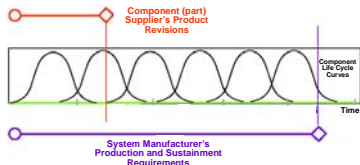
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Obsolescence Definition

Obsolescence is defined as the loss or impending loss of original manufacturers of items or suppliers of items or raw materials.

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



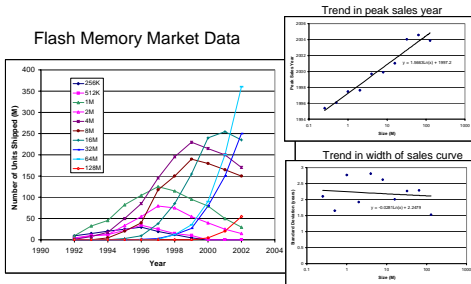
Objective

- Nearly 100% of the focus in electronic part obsolescence management is on reactive mitigation.
- Much larger savings are possible if methods of forecasting obsolescence and performing obsolescence driven life cycle planning of products were developed and applied.
- Our objective is to address this high-risk high-impact problem at a more fundamental and proactive level with the investigation of proactive obsolescence forecasting and management.**

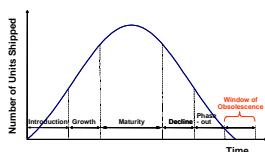
Forecasting Obsolescence

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

Life cycle curve of specific electronic parts can be predicted from historical market data.

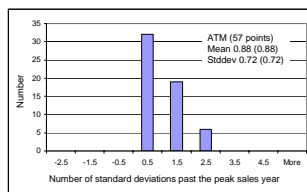


The trend equations developed from data like that for flash memory above allow the life cycle curve for future flash memory chips to be forecasted.



The prediction of the "Window of Obsolescence" is supplier specific and can be formulated by data mining historical last order dates.

Forecasted date of obsolescence for Atmel (ATM) flash memory as a function of the memory size in Mbytes (M)



Number of standard deviations past the peak sales year for ATM Flash

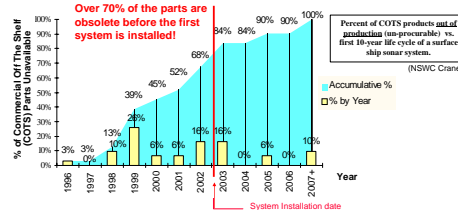
$$1.5663 \ln(M) + 1997.2 + [0.88 \pm 0.72x](-0.0281 \ln(M) + 2.2479)$$

Peak sales date Standard deviation in sales data

No technology typifies 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," first 10-year life cycle of a surface ship sonar system. <http://www.electronicstalk.com/news/text/489.html>, Aug 19, 2003.



Research Tasks

- Forecasting electronic part obsolescence to predict the date of discontinuance and confidence interval in light of uncertainty in objective data and subjective inputs such as social, political, economic, and environmental factors,
- When obsolescence does occur, determine the best mitigation approach to employ, and
- Proactively manage the redesign of systems based on forecasted obsolescence, production and support plans, and available mitigation strategies.

Background

- 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.
- An understanding of the common attributes of product sectors that are obsolescence sensitive will enable the application of existing engineering design and decision methodology to the problem.

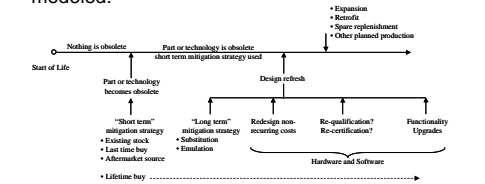
Broader Impacts & Intellectual Merit

- Rapid growth of the electronics industry driven by consumer products has resulted in rapid introduction and discontinuance of electronic parts.
- Low-volume complex electronics is the most vulnerable.
- Examples: Airplanes, ships, submarines, traffic lights, computer networks, industrial equipment.
- Impact and pervasiveness of obsolescence is a growing problem.

Proactive Planning

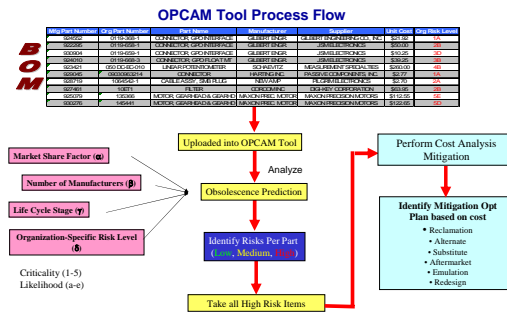
How can obsolescence forecasts be used to enable proactively planning the sustainment of systems?

- Design refreshes are performed on sustainment-dominated systems to update functionality/performance and to mitigate obsolescence.
- Design refreshes must balance the cost avoidance from mitigating obsolescence with potentially large costs associated with system redesign and re-qualification.
- To perform design refresh planning, a timeline of obsolescence, mitigation, production, and design refreshes for hardware and software must be modeled.



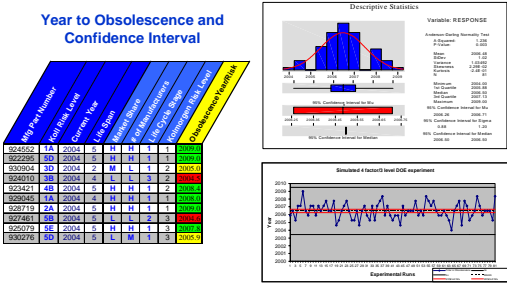
Obsolescence forecasting and analysis of its impact on a specific organization requires considering a mix of objective and subjective inputs including:

- Life cycle stage of the part (topic of left column)
- Number of sources (manufacturers) of the part
- Where and how the part is used within the organization



Kollmorgen Electro-Optical, a manufacturer of submarine periscopes systems for the US Navy, is constantly plagued by increasing challenges of component obsolescence.

An obsolescence analysis of computer processors for Kollmorgen:



- The MOCA (Mitigation of Obsolescence Cost Analysis) methodology determines the optimum design refresh date(s) based on:
 - Forecasted technology obsolescence (what and when)
 - How obsolescence events are mitigated
 - Production, retrofit and sparring requirements

