Electronic Part Obsolescence

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Definition and History
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.

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

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.

The life-cycle curves of specific electronic parts can be predicted from historical market data.

Lifetime Buy Quantity Optimization
When an electronic part becomes obsolete, lifetime buy is a mitigation approach that involves the purchase and storage of a part in a sufficient quantity to meet current and (expected) future demands.

Determining the optimum number of parts to purchase at a lifetime buy, is generally easier said than done. How should the risk of buying too few parts be balanced with the cost of excess inventory when all the input data is uncertain?

Stochastic Individual Buy Model:
- Computes buy sizes that satisfy a specified confidence level
- Computes the probability of being overbought or underbought by a user specified quantity

Human Skills Obsolescence
The loss of critical human skills is a problem for legacy system support organizations as they try to understand and mitigate the effects of an aging workforce with highly specialized, low-demand skill sets.

Existing research focuses on workers that have skills that are obsolete and therefore need to be retrained; alternatively we addresses system support impacts due to the lack of workers with the required skill set.

Customers and Partners
Over the past 15 years, obsolescence management research has been conducted for over 25 customers and on many programs including:

Obsolescence Management
Research Partners:
- ARINC
- Dow Chemical
- µs2
- Harris Corporation
- Honeywell
- Lockheed Martin
- Motorola
- National Science Foundation
- Naval Postgraduate School
- PartMiner (ihis)
- Price Systems
- Rolls Royce
- SiliconExpert (Arrow)
- TaTech (ihis)
- US Air Force
- US Navy

Refresh Planning Programs:
- AS900 FADEC (Honeywell)
- F-22 Radar (Northrop Grumman)
- Apache MTADS (Lockheed Martin)
- VH-60N Digital Cockpit Upgrade (Price, NavAir)
- GTR8000 RF Base Station (Motorola)
- Communication Systems (Argon ST, DML, UK MOD)
- DANS (ARINC, Amy CECOM)
- LPD-17 NAV NDU (NSWC Crane)
- V-22 7 subsystems (NavAir)
- Navy communications systems (Argon ST, NIWA)
- Integrated Shipboard Network System (PMW-160)
- NAVSEA radars (NSWC Crane)
- Medical equipment (Ortho-Clinical Diagnostics)
- SBlent Tower Comm (DHS/NavAir)
- Sea Sparrow Missile (ES/SM-Raytheon)
- LA Class submarine subsystems (PM6 425)
- Industrial Controls (Rockwell Automation)

Design Refresh Planning
How can obsolescence forecasts be used to enable strategic planning for 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.

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 sparing requirements