Collaborate Innovate Accelerate

Global Program Management's Achilles Heel

Electronic and Mechanical Component Obsolescence in the Public and Private Sectors

By T. Miglani, D. Cahill and F. Kelly

It is estimated that the Business-to-Government (B2G), Business-to-Business (B2B) and Business-to-Consumer (B2C) sectors combined spend over $20 billion annually to mitigate the risks associated with electronic and mechanical component obsolescence. Of that total, it is estimated that $10 billion is spent by the Department of Defense (DoD) alone.[1]

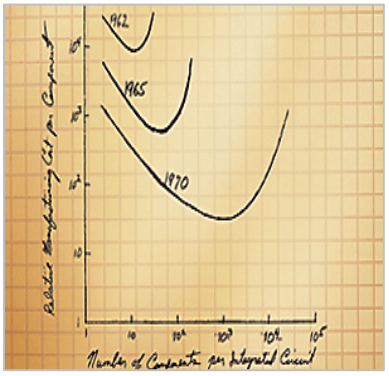

Figure 1: Gordon Moore's (Intel) original graph from 1965.

According to Moore's Law (Gordon Moore, the co-founder of Intel theorized this in 1965, see **Figure 1**) the number of transistors in an IC will double every 18 months.[2] Almost every measure of the capabilities of digital electronic devices is strongly linked to Moore's law: Processing speed, memory capacity, even the size of pixels in digital cameras. Basically, it states that any hardware you have today will become obsolete in 18 months. Moore's Law, at its very heart, is a "law" of product obsolescence. Electronic component obsolescence is caused by several factors, with decreasing average life-cycles for integrated circuits due to the *smaller*, *faster* and *cheaper* mantra leading the way, as the most prominent of causes (see **Figure 2**). Add in

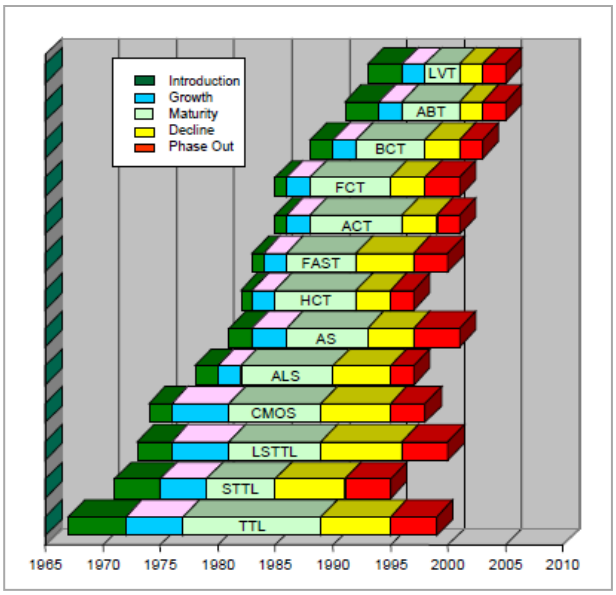

Figure 2: Life-cycles of all integrated circuit technologies are shrinking, almost to the point where the term *component technology life cycle* is meaningless.
Source: Baca, M., "TACTech Electronic Component Obsolescence Management", presentation to Boeing Electronic Component Management Users' Forum, TACTech, March 4, 1997.

[1] Peter Sandborn, "Trapped on Technology's Trailing Edge," IEEE Spectrum, 15 May 2008: 3.
[2] "Moore's law", From Wikipedia, the free encyclopedia, 17 October 2009, <http://en.wikipedia.org/wiki/Moore's_law>

competition from *Chaiwan* and stringent environmental regulations, such as RoHS, WEEE and REACH as other significant contributors to this conundrum. Hence, when parts go End-of- Life (EOL), suppliers such as Intel and Texas Instruments have to send Product Change Notifications (PCNs) to their customers, which notify them of this EOL issue, as well as other component events. This dynamic certainly affects both Public (specifically DoD) and Private (specifically Consumer) sectors in uniquely different ways. As component obsolescence is not industry-specific, it is important to note that big-ticket products and systems such as those from the automotive, transportation, aerospace, defense, medical equipment, telecommunication and utilities industries are particularly susceptible, as these systems are inherently high-cost due to their need to deliver safety and performance over a longer service life to realize return-on-investment (ROI).[3] When you take the current economic recession into account, both Public and Private sectors are under even more pressure to reduce costs and exercise tighter *fiscal* discipline. We'll now take a look at specific examples of electronic and mechanical component obsolescence in DoD and the Private sector in the following sections.

Utilities such as nuclear power plants are vulnerable to electronic and mechanical obsolescence as they are both unique and complex with life expectancies of up to 40 years.

Although the ships of the U.S. Navy are modular in design, the inherent complexities of their systems and long service lives require high sustainment costs, including those related to mitigating obsolesecence for electronic parts.

For DoD, the increasing life span of current and future weapon systems, coupled with rapid advances in commercial electronic technologies and the subsequent decline in availability of dedicated military electronics (mil-spec), are the primary reasons for increasing obsolescence. This affects military weapon systems, particularly in the sustainment phase after initial program launch, where 80% of total program costs are incurred. Hence, with DoD's increased use of commercial off-the-shelf, or COTS, products, it is at the mercy of the consumer sector, which is driven by rapid technology innovation as a result of the insatiable appetite for "more speeds and feeds" performance for maximum communications mobility. The problem of unavailable parts has plagued the military for years and it is aggravated with globally deployed forces which make logistics difficult. Therefore it is not

[3] "Man aging Obsolescence risks for complex or Long-Life Systems", LMS, 26 September 2008, 17 October 2009, < http://www.hotfrog.co.za/Companies/Logistical-and-Mechanical-Services-LMS/Obsolescence-Management-of-complex-systems-17>

uncommon for both new and mature systems to become inoperative due to unavailable parts. The Air Force was faced with severe obsolescence issues with the B-2 Spirit stealth bombers' defensive management system in 1996. Rather than spend $54 million to have the original contractor replace the whole system, the Air Force elected to redesign a few circuit boards and replace other obsolete integrated circuits for $21 million.[4] One of the other reasons why DoD struggles with obsolescence management of electronic components is due to their delegated approach in identifying supplier-base concerns. This has been managed locally by the military services, program offices, or prime contractors to identify and report these concerns, including gaps or potential gaps and managed them without DoD intervention.[5] As no mandatory requirement for when to report such gaps to higher-level offices exist, knowledge of defense supplier-base gaps across DoD may be limited. The DoD has basically asked Program Managers to incorporate technical data rights per the latest DoD Defense Acquisition Guidelines, 5000.2 (DoDI 5000.02, December 8, 2008) as part of the contracts to facilitate obsolescence management within their projects. In **Figure 3**, the table from the GAO-09-5 Report to the Chairman (October 2008) shows that while 16 of the 20 program officials GAO surveyed reported that they identified supplier gaps or potential gaps over the past 5 years, only 4 reportedly shared this information with DoD Industrial Policy. The mission of Office of the Director, Industrial Policy is to sustain an environment that ensures the industrial base on which the Department of Defense (DoD) depends is reliable, cost-effective, and sufficient to meet DoD requirements. Specifically, Industrial Policy is responsible to ensure that DoD policies,

Programs Surveyed That Identified Obsolescence or Sole Sources within the Last 5 Years

Program	Obsolescence	Sole source
AGM-114 Hellfire Air-to-Ground/Air-to-Air Guided Missile	X	X
B-2 Spirit Multi-Role Bomber	X	X
CH-53K Super Stallion Heavy-Lift Replacement Helicopter	X	
F/A-18E/F Super Hornet Navy Fighter Attack Aircraft		X
F/A-22 Raptor Fighter Attack Aircraft	X	X
Joint Tactical Radio System—Ground Mobile Radio	X	X
MQ-8B Navy Fire Scout Unmanned Helicopter		X
MQ-9 Reaper Armed Unmanned Aerial Vehicle		X
Patriot Advanced Capability Missile-3	X	X
RIM-162 NATO Evolved SEASPARROW Missile System	X	X
RQ-4 Global Hawk Unmanned Aerial Vehicle		X
Space-Based Infrared System High (Satellite)	X	X
Space Tracking Surveillance System (Satellite)	X	X
UH-60 Black Hawk Tactical Transport Helicopter		X
V-22 Osprey Joint Service Tilt-Rotor Aircraft	X	X
VH-71 Presidential Helicopter	X	X

Source: GAO analysis of survey responses from and interviews with 20 selected DOD weapon program officials.

Figure 3: The GAO found that 16 of 20 programs identified supplier gaps or potential gaps over the past 5 years.

[4] Peter Sandborn, "Trapped on Technology's Trailing Edge," IEEE Spectrum, 15 May 2008: 1.
[5] "A Department wide Framework to Identify and Report Gaps in the Defense Supplier Base Is Needed", United States Government Accountability Office, GAO-09-5 Report to the Chairman, October 2008, Pg. 2

procedures, and actions: (1) stimulate and support vigorous competition and innovation in the industrial base supporting defense; and (2) establish and sustain cost-effective industrial and technological capabilities that assure military readiness and superiority.[6] These gaps reported in the GAO-09-5 Report included obsolescence of components and items with only one available supplier. It was found that program managers often relied on prime contractors to address supplier-base gaps and that this was discretionary with no formal mechanism to elevate gaps to higher levels. Hence, Industrial Policy may not be receiving information to help it activate available tools, such as leveraging DoD research and development, acquisition, and logistics decisions to promote innovation, competition, military readiness, and national security; along with statutory processes (the Defense Priorities and Allocations System) to mitigate supplier-base gaps. Let's take a look at a sample range of obsolescence costs associated with DoD projects in order to better understand the ramifications of not planning properly for proactive obsolescence. In **Figure 4,** these are costs developed from the military sector and derived from the GIDEP DMS Utilization Module. It is important to note that these numbers can't be attributable to any particular organization but they do illustrate the increasing costs associated with less favorable resolutions to Component Events such as obsolescence. Another example of the costs liabilities inherent in electronic and mechanical obsolescence are the costs of not getting the notification (Product Change Notification or PCN) of a Component Event, such as End-of-Life (EOL). We have provided an example of the potential cost liabilities from missed PCN notices from the IHS PCNAlert Event Monitoring and Notification in **Figure 5**.[7] One can see that the annual potential cost avoidance from missing *one* EOL notification ranges from $5K and $30K dollars.

Relative Cost of Component Event Resolution Options		
Alternative	**Low Cost**	**High Cost**
Choosing an alternate (equal or better specs)	$4,000	$9,000
Choosing an alternate (worse specs)	$15,000	$24,000
Aftermarket (not broker)	$41,000	$59,000
Minor Redesign	$82,000	$153,000
Major Redesign	$361,000	$505,000

Figure 4: Sample range of costs of obsolesecence options.

One Year Potential Cost Avoidance	
PCNs sent	374
EOL notices sent	117
Avg. notices sent per month	41
Avg. missed EOL cost	$5K-$30k
Potential Cost Avoidance	$585K-$3.51M

Figure 5: One Year of Component Event Monitoring: $585,000 - $3.5M in potential cost avoidance.

As we look more in depth into the Private sector electronic and mechanical component obsolescence in this section of the paper, it is important to point out that the current economic recession has had significant impact on the world economy. More

[6] "Mission", Office of the Director, Industrial Policy, DOD, 18 October 2009, <http://www.acq.osd.mil/ip/>
[7] "Leaders Dealing With Volatility", EDN Web Conference, Sponsored by IHS, 08/28/2009, Slide #15

Transportation infrastructure and systems such as high-speed rail are huge investments where capital equipment must perform reliably and frequently to generate profits.

specifically, within the semi-conductor industry, Spansion went bankrupt in March 2009 and created shock-waves in the electronics industry as companies had to scramble to get alternate sourcing to sustain their business. Spansion was the world's largest manufacturer of flash memory chips, which go into virtually all electronic goods. This event really underscored the need for obsolescence management within the semi-conductor industry.

According to Peter Sandborn, a University of Maryland professor of mechanical engineering who authored "Trapped on Technology's Trailing Edge", one of the reference sources used in this white paper, the systems hit hardest by component obsolescence are the ones that must perform flawlessly. Professor Sandborn adds, "These technologies for mass transit, medicine, the military, air-traffic control, and power-grid management, to name a few, require long design and testing cycles, so they cannot go into operation soon after they are conceived. Because they are so costly, they can return the investment only if they are allowed to operate for a long time, often 20 years or more."[8] Even products and systems with short life-cycles, such as those manufactured for the computer, telecommunications and electronic industries, are affected by electronic component obsolescence. For example, in the consumer electronics industry, the rapid technology advances of IC's and semiconductors are resulting in decreased life-cycles of approximately two years, which is also shrinking new product launch intervals, as electronic goods manufacturers fight to deliver the latest innovation and high-performance to steal market share. These higher frequency product launches require continuous investments in R&D and marketing, which is forcing product management to look at lower cost components to meet reduced life-cycle requirements. In fact, one could say that *planned obsolescence* is designed into the latest consumer electronic devices to adapt to this trend of smaller, faster and cheaper chips and more frequent product launches into market.

Product life-cycles for electronic gadgets are getting shorter (2-3 years), driven by smaller, faster and cheaper integrated circuits, whose life-cycles themselves are also short (2 years).

As we mentioned, it is estimated that the combined Public and Private sector spends more than $20 Billion annually to mitigate the risk associated with electronic and mechanical components

[8] Peter Sandborn, "Trapped on Technology's Trailing Edge," IEEE Spectrum, 15 May 2008: 2.

obsolescence. This is a vast market and Tachus Technologies Inc. has solid industry contacts, strategic alliances, tribal knowledge, and a robust portfolio of services. Tachus Technologies Inc. was founded to tackle and resolve the problems of component obsolescence and the ever shortening product lifecycles in electronics technology nowadays. Tachus is currently developing a powerful proprietary software tool that shall enable electronics design & manufacturing companies to effectively manage product obsolescence. This tool shall enable Tachus to provide a turnkey solution to firms, that addresses the Product Lifecycle Management dilemma which causes both time and cost liabilities in today's rapidly changing electromechanical components market. In conclusion, Tachus Technologies has established long-term strategic relationships with key industry players to develop cost-effective solutions to mitigate obsolescence risks.

To find out more about Tachus Technologies' portfolio of value-added services and solutions please visit our website @ http://www.tachustech.com or contact Frank Kelly at 1-908-374-5400