Military Throwaways?

Why Acquirers Should Go Disposable

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The military tends to keep equipment for a long time. Unfortunately, extended product life cycles leave many operators with worn-out or obsolete gear. Aircraft, vehicles, ships, radars and radios are examples of the outdated equipment our Armed Forces use daily.

There are many reasons to keep equipment for 10, 20 or 30 or more years. Some equipment never goes out of style—a well-maintained 105-millimeter cannon is just as effective today as it was 20 years ago. Other items stand the test of time even in the face of ever-evolving threats—the KC-135 aerial refueling aircraft served just as well in the Gulf War as it does now against al Qaeda. Still others cost too much to refresh on a regular basis—we probably won't divest the F-22 stealth fighter jet anytime soon. These cases provide a framework for what can be considered a "traditional" materiel acquisition: Robust designs intended to provide a long-term return on investment.

This article aims to challenge the idea of traditional materiel solutions by proposing a disposable alternative.

"Disposable" products get a bad rap. Often characterized as cheap, flimsy or wasteful, these products fill interim needs when more robust solutions would be overkill. But disposable products aren't all paper plates and napkins; let's think more along the lines of smart phones and automobiles. Both have realistic life cycles of 2 to 10 years. Both can be repaired, reused and/or recycled (to a limited extent). Neither is "cheap" or "flimsy." Both are indispensable parts of our day-to-day lives. Both are disposable.

Using these consumer products as our baseline for disposable equipment, we'll now turn to military needs and the applicability of disposable goods to a customer that often measures

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effectiveness in decades. It is undeniable that pace is a central theme to this discussion. Things change when research and development efforts take multiple years, but this is not another argument for rapid acquisition. It is an argument for a fundamental examination of the solutions proposed to satisfy military requirements. Why can't we have 5- to 10-year life cycles versus 30-plus years? Assuming that the military customer would embrace a disposable solution and could acquire what it needs through the existing Department of Defense (DoD) acquisition construct, we are left with the following question: What criteria could an acquirer use to determine if a requirement should be satisfied with a disposable solution? The first criterion outlines the effects of technology refreshment and its impact on existing systems. The second criterion involves rapid threat evolution and its adverse effects on U.S. military equipment. The final criterion is cost. Disposable military equipment should be pursued when the technology, threat and cost all support a product life cycle of less than a decade.

The first consideration when contemplating a disposable military solution is technology. Rapid technological advancement quickly renders obsolete otherwise functional equipment. Your 10-year-old automobile may still be functional, but it probably lacks many of the features (navigation systems, back-up cameras, electronic traction control, etc.) present in today's models. To stay "competitive," you need to make some major overhauls or simply buy new. The same could be said for some of our most technologically advanced military systems. Why does our B-52 strategic bomber have an avionics computer that is measured in thousands of instructions per second when an iPhone is measured in millions of instructions per second? No longer is dumb steel sufficient to dominate the battlefield. Products must be smart, agile and allow users to make sense of it all.

Technologies in the areas of materials, electronics and manufacturing have revolutionized 21st-century warfighting equipment. Everything from aircraft to radios has a size, weight and power (SWaP) consideration that could be renewed with the regularity of Moore's law (the doubling of transistors per square inch every year). In reality, some products can still be effective more than 2 years after fielding.

But what about those technologies that fundamentally change, beyond just software advances, from year to year? The current military acquisition strategy is to incrementally upgrade or replace existing components to extend the life of the system. This strategy works for a while, but ultimately results in a steady degradation in capability typified by Diminishing Manufacturing Sources (DMS)—the industry-accepted term for addressing components so outdated they no longer are manufactured. Unfortunately, the military regularly deals with DMS issues. Going disposable would alleviate DMS concerns and allow us to transition more quickly from one fielded product to the next. Disposability facilitates agility.

So what specifically should an acquirer consider when evaluating technologies for disposability? The main consideration should be whether the primary function of the product is subject to rapid market changes. An iPhone could be used as a hammer for 100 years, but its primary function will be obsolete in 5 years. Look for solutions requiring rapidly evolving technologies and you will find the opportunity for a disposable product. Once a technological determination is made, an acquirer can consider the expected impact from external threats.

The threat today is not the one we faced yesterday nor is it the one we will face tomorrow. The pendulum constantly shifts between peace and war, thereby requiring flexibility within our military resources. Our military's task is to be effective not only throughout the range of military operation but to do so against a constantly evolving enemy within a tactical environment that also is dynamic. It often is forgotten that the enemy gets a vote. Our adversaries will continue to develop, counter and deploy new capabilities and tactics, techniques and procedures (TTP). There are endless variables, and not even our best strategist can predict the threats of tomorrow; so flexibility is the cornerstone of our nation's military might.

Our adversaries' technology and TTPs combined with the operational environments always are changing. The enemy can develop a new technology or TTP to attempt to get inside our observe, orient, decide and act (OODA) loop, causing confusion and disorder. Consider what happened during the Cold War with the Soviet Union. In the 1940s and 1950s, it was thought that the next generation bomber would have to be a supersonic high-altitude nuclear bomber. After decades of development, the B-58 supersonic delta-wing medium bomber was born. But after all that development and promise, the environment seemed to change overnight with the advent of deadly surface-to-air missiles. The B-58 became limited in its abilities even as it was rolling off the production line. Ultimately, the weapon system was considered obsolete in fewer than 10 operational years. Why are we to believe that the fate of the F-35 and F-22 fighter jets or Long-Range Strike Bomber will be any different?

Threats also can spark development or use of environments we never envisioned in the past. Consider the surprise of the British during the American Revolutionary War when they realized the destructive power of David Bushnell's game-changing submarine nicknamed the "turtle." Warships with all the firepower then available were held at risk by a hand-operated, single-man submarine. Now fast forward 240 years, and consider the vast possibilities cyberspace offers. Technology has created a new environment that can sabotage nuclear reactors and use social media to recruit transnational extremists. The dynamic nature of technology, the ever-changing TTPs, and the shifting environments must cause the acquisition community to pause and think of new ways to remain agile and maintain our superiority.

Rapid changes in the external threat and internal technologies ultimately must be balanced with the ability to pay for a disposable solution. Even if the DoD one day finds itself removed from the shadow of budget sequestration, it is forever answerable to the taxpayer for responsibly using federal funds to achieve National Security Strategy objectives. Therefore, we cannot discuss the revolution of disposable technology without applying our understanding of how it would fit within the current budget limitations, grounded in a reasonableness determined by fair market value. As with anything, the determination of "reasonableness" depends greatly on the environment and facts surrounding the procurement. Based upon the timelines a disposable tech policy would drive, cost can be looked at under two broad categories: reactive and proactive.

Procurement of disposable tech can be justified if the need is immediate—driven by the urgency of an emerging requirement or threat. It can be argued that, if we're forced to respond reactively, cost is largely removed as an obstacle to procurement. An assessment is expected of cost to complete, dollarized risk, logistics costs and other life-cycle costs against a small number of companies. But ultimately, the nation will buy what the soldier, airman, seaman or Marine needs to enter into combat in this situation. Cost will inform, but not drive, the procurement decisions. We've seen this phenomenon most recently with the explosion of funding for Overseas Contingency Operations in 2003–2010. This added funding to meet operational needs either has directly funded—or provided the offset for—mine-resistant vehicles, low-collateral-damage weapons, and counter-rocket artillery mortar technology, to name a few items.

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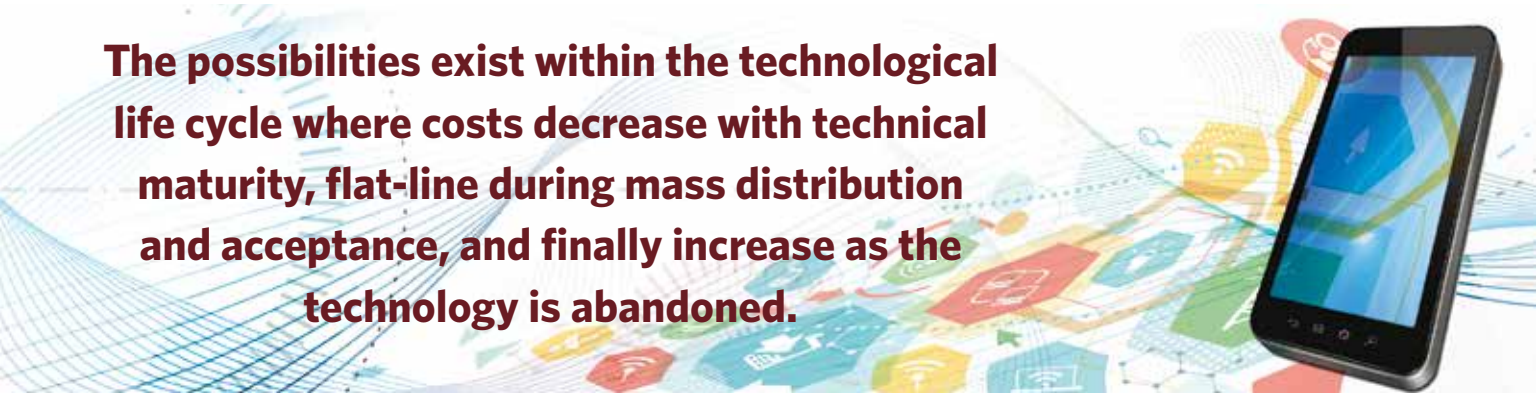
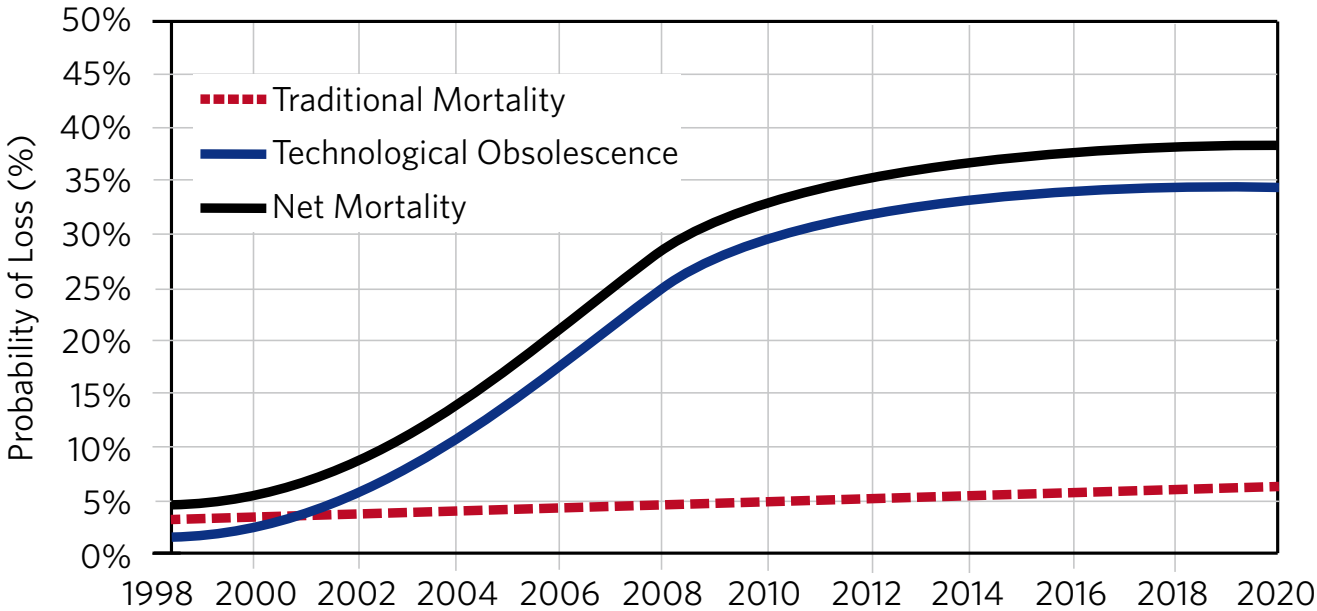


The other side of cost is represented by a business case in which it makes the greatest financial sense to proactively address technical obsolescence, hardware or software, through tech refresh rather than traditional system sustainment. Services often address technical obsolescence through end-of-life buys, aftermarket manufacturing, component replacement within the obsolete item itself (motherboards, switches, lines of code, etc.) and other solutions that equate to replacing a car's major subcomponents rather than complete replacement with a new vehicle. This practice is rife within the DoD. Traditional life-cycle modeling has focused on environmental conditions we attribute to usage and the environment. Stephen L. Barreca in an article titled "Technical Life-Cycles and Technical Obsolescence" (Barreca Consulting and Research, Inc., UAB Technology Center, Birmingham, Alabama) honed this argument by insightfully assessing that, not only is technological obsolescence a significant driver behind overall system obsolescence, it may in fact be the primary driver in our assessment of a replacement timeline.

Figure 1. Obsolescence Timeline Chart



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A 2003 article by P.A. Sandborn, T. Herald, J. Houston and P. Singh and titled "Optimum Technology Insertion into Systems Based on the Assessment of Viability" (Institute of Electrical and Electronics Engineers, December 2003) argued for use of proactive modeling, MOCA mobile care or other, to assess the appropriate time to leave one technology and step to another. While the time component of our thesis was addressed earlier, ultimately technological life cycle is a repeatable process in which traditional methods of sustainment can stave off a system's death while proactive methods develop and field replacement systems capitalizing on improved technology. These same authors would postulate that these practices allow for budgetary planning and forecasting that truly makes replacement more cost-effective. The possibilities exist within the technological life cycle where costs decrease with technical maturity, flat-line during mass distribution and acceptance, and finally increase as the technology is abandoned. Those left behind are forced to pay increasingly high prices as support dwindles.

Clearly, there is a time and place when and where it makes good business sense to pursue disposable technology. Whether in reaction to operational environment changes, or thoughtful and proactive planning, altering how we view life cycles at the component or systems level and bravely capitalizing on available technology may make us more responsible to the taxpayer and yet more capable against our adversaries. Failure to think through Moore's Law and its applicability to the cost condition only enables our wasteful spending habits by fielding technology that is no longer viable, needed or relevant.

Some would argue that our acquisition framework is not set up for disposable technology. With a lengthy requirements process, daunting acquisition timelines and deliverables and a yearly budget cycle, there is no way disposable technology can be effective. When our backs are against the wall, we utilize Joint Urgent Operational Needs Statements, establish undefinitized contract actions and request overseas contingency operations funds, all of which provide the flexibility and speed to field solutions. They all, however, are shortcuts in an arduous process. We need a system that stands between the urgent operational need and our current acquisition pace.

The current personal survivor radio is an example of a good idea at program initiation that no longer makes sense. It has taken a decade to fully field the Combat Survivor Evader Locator radio and it is cumbersome, obsolete and falls short of what can be done today in a device half its size. This capability doesn't satisfy the criterion of urgent operational need, but it does require expedited procurement. It is just one example of disposable tech where visionary acquirers will be needed to boldly implement disposable technology.

Military requirements that necessitate rapid response in a dynamic threat, tech and cost environment should be satisfied with intentionally disposable solutions. Technological change modifies the industrial base many times faster than traditional materiel acquisitions. The pace of threat evolution continues to minimize the effectiveness of technologically static weapons systems.

Cost balancing makes disposable products affordable. Disposable technologies are a reality of the modern world. The sooner the military embraces this reality, the better.

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