DoD Can Speed Technology Insertion. Here's How

The Pentagon says commercial technology is now essential, but current mid-tier defense suppliers and open architectures are the key to unlocking these resources.

MARK ASLETT
PRESIDENT & CHIEF EXECUTIVE OFFICER

MERCURY SYSTEMS, INC.
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Recent global events such as Russia's intervention in the Crimea, Ukraine, and Syria, and China's expanding defense capabilities, have made it clear to the Pentagon that the technological supremacy the U.S. has long enjoyed in radar, communications, and especially electronic warfare is being threatened, and that the U.S. has no quick fix on order. The situation has even prompted Congress to react, where several legislative bills are in play that propose to leapfrog DoD's complex procurement process to speed the latest technology to the warfighter.

To address these problems, DoD has embarked on a three-part strategy: foster strong, long-lasting partnerships between the government and the nation's high-tech companies that serve the commercial sector, simplify and speed up its procurement process, and broadly employ the use of open architectures to build electronics systems throughout the services. The attention being paid to all three of these initiatives throughout DoD is an excellent indication of how important the agency feels they are and how serious it is about implementing them. What's more, DoD frequently has stressed the importance of increasing the speed at which new technology can be deployed. As Defense Secretary Ashton Carter recently stated, "*…leading the [technology] race now depends on who can out-innovate faster than everyone else*". In other words, speed is paramount and should trump cost-savings.

Nevertheless, there are three areas in which we believe DoD can more effectively achieve its goals, and Tier 2 and Tier 3 subcontractors like Mercury can play an important role in the effective realization of all three.

Step 1: Bridging the Gap

The DoD's recent pivot to Silicon Valley and by extension, the high technology community in general, is an indication of how serious the DoD is about rapidly acquiring commercial technology. But in reaching out to the commercial high-tech world directly, the DoD is inadvertently skipping over one of its greatest assets – the Tier 2 and 3 subcontractors that act as an "impedance match" between the speed of technology development in the commercial world and the rate of its adoption in defense and, in particular, the ones that operate as commercial companies. Today the commercial world produces technology five times faster than the DoD can adopt it. While this mismatch is caused by a number of factors, none of them are insurmountable given the right incentives. In order to enable commercial companies with no relationship with the government to become defense industry participants will require a bridge between them and the government, a role that the traditional mid-tier suppliers can effectively perform.

And while it is certainly true that the state-of-the-art in certain technologies resides in the commercial world, much of this technology is already being used within defense embedded systems and many other areas of defense electronics. In fact, some technology used within defense systems is actually more advanced than what is used in commercial systems. As manufacturers of defense electronic systems are also well-versed in the complexities of defense procurement, they are arguably best equipped to ensure that DoD's open architecture initiatives are achieved in the fastest and most affordable manner.

Finally, "mid-tier' suppliers can be essential for bridging the gaps between the cultures of commercial companies and the government. They should obviously be represented in any discussion concerning advancing the technologies that will better enable the warfighter.

Step 2: Streamlining Open Architecture Deployment

The benefits of open architectures are well understood within the Pentagon, and the Air Force, Army, and Navy are independently and collectively working to develop and apply them to future systems. DoD defines an open architecture as a modular approach that uses widely-supported standards for major system interfaces between a system platform and its primary system components. It must allow components to be added, removed, or replaced throughout the life of the system using products from multiple vendors without massive redesign and while also providing far greater interoperability.

DoD is rightly concerned with the mitigation of risk and reducing cost, as it uses taxpayer dollars to pay for everything it does. So it's not surprising that the Pentagon views the benefits of open architectures as being able to reduce this risk and cost through dramatic reductions in life-cycle expense by focusing on greater commoditization and competition. In contrast, industry views open architectures as a tool to rapidly innovate, adopt new technologies, and amortize the costs of technology investments across multiple platforms.

Unfortunately, DoD's emphasis on commoditization will stifle industry's desire to invest in innovation as it places a premium on cost versus performance. The result could well be precisely the opposite of what it hopes to achieve in advancing and maintaining technological superiority. Instead, the DoD should allow open architectures to permeate future platforms and let their inherent advantages and modular, "plug-and-play" approach to technology insertion reap cost benefits not just initially but increasingly over the life of the system.

Some open software and hardware architectures like this have been staples of defense embedded systems as well as virtually everywhere else in the electronics industry for decades. Without them there would be no Linux, Ethernet, USB, PCIe, VME, OpenVPX, or any other form factor, interface specification, or communication standard to work from. Mercury Systems is certainly no stranger to open architectures as the company was responsible for launching OpenVPX (VITA 65), the first system-level VPX specification for the design of VPX-based systems using a broad array of interoperable COTS hardware building blocks from multiple suppliers. More recently, having accomplished this in the mostly digital domain of embedded systems, Mercury has proposed the "OpenRFM" architecture for Integrated Microwave Assemblies (also known as microwave subsystems).

OpenRFM allows IMAs to be constructed in 3U and 6U form factors, allowing them to work within OpenVPX. As OpenVPX has in only a few years started to become incorporated into defense systems, RF and microwave subsystems remain the only part of radar, communications, and EW systems that do not conform with standard form factors or an open architecture. However, the Army and Navy believe IMA manufacturers must ultimately bite the bullet and adopt this approach in order for the full measure of "openness" to be achieved.

This will not be a trivial task, as the RF and microwave industry currently does not have nor has ever needed open architectures, as each system it builds is typically crafted to meet the specifications for a specific platform. Consequently, adopting an open architecture will require a paradigm shift in the way it manufactures IMAs, but while this will take considerable effort it is certainly achievable.

Step 3: Adopting a Realistic Business Model

Mercury has developed a next-generation business model that has already reaped benefits for the company by matching the rate at which it introduces commercially-available technologies with the rate at which its customers can procure and adopt them. This approach effectively bridges the aforementioned gap between when technology is available and when it can realistically be deployed. And it fits neatly within DoD's initiative to exploit the benefits of commercial technology, wherever possible.

The business model has three basic tenets: quickly and affordably adopting commercial technology, investing more in internal research and development to foster more advanced solutions, and creating pre-integrated subsystems based on a modular building-block architecture so that customers can use open application programming interfaces to easily and quickly configure solutions to meet mission-specific requirements, while also reducing cost and time to market.

Mercury has been successfully using this business model for several years and continually revises and expands it as new knowledge is acquired. It has been very well received by our customers once they experience firsthand how reconfigurable modular systems can be reused with little modification and without lengthy and expensive redesigns, allowing savings to accrue through the amortization of investment cost over many programs.

The model has the added benefit to DoD of allowing it to develop a more agile defense procurement strategy that enables new technologies to be inserted into platforms when they become available, producing a positive effect on life-cycle cost reduction. Mercury admittedly created this business model for its own benefit, but there is no reason why a similar approach cannot be used by others.

Summary

All three DoD initiatives are obviously formidable endeavors. However, all three must be achieved, at least in part, in order to allow the U.S. to meet the challenges posed by its adversaries, and there is no time for delay. Reality dictates that this is far from easy, but surely not impossible. If DoD provides realistic incentives to the commercial sector, makes sincere and comprehensive efforts to strip away its Byzantine layers of bureaucracy, reaches out not just to prime contractors and the commercial sector but to the Tier 2 and Tier 3 subcontractor community and other critical sectors of the supply chain, much of this can be accomplished. As for open architectures, it's just a matter of time before they become the way almost every defense electronics system is designed and constructed. Logic dictates that there should be no insurmountable obstacles if all parties put aside their prejudices and approach the tasks ahead with an open mind.

The defense industry and the security of the nation demand it.

About the Author

Mark Aslett is President and Chief Executive Officer of Mercury Systems and is a member of its Board of Directors. He brings in-depth experience that spans the technology industry, across a variety of markets that include telecommunications, data networking, security, defense and life sciences. Within these areas, Mr. Aslett has held strategic-level positions in or has been responsible for engineering, operations, marketing, business development, portfolio management, and general executive management.

Prior to joining Mercury, Mr. Aslett was President and Chief Executive Officer of Enterasys, and held various positions with Marconi plc and its affiliated companies, including Executive Vice President of Marketing, Vice President of Portfolio Management for Marconi Capital, and President of Marconi Communications - North America. Mr. Aslett has also held positions at GEC Plessey Telecommunications, and other telecommunications-related technology firms. He started his career at British Telecommunications plc as a software engineer.

A native of the United Kingdom and a naturalized United States citizen, Mr. Aslett has an extensive background in global business. Mr. Aslett has a master's degree in business administration from Harvard Business School and a First Honors bachelor's degree in digital systems engineering.

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CORPORATE HEADQUARTERS
201 Riverneck Road • Chelmsford, MA 01824-2820 USA • (978) 967-1401 • (866) 627-6951 • Fax (978) 256-3599