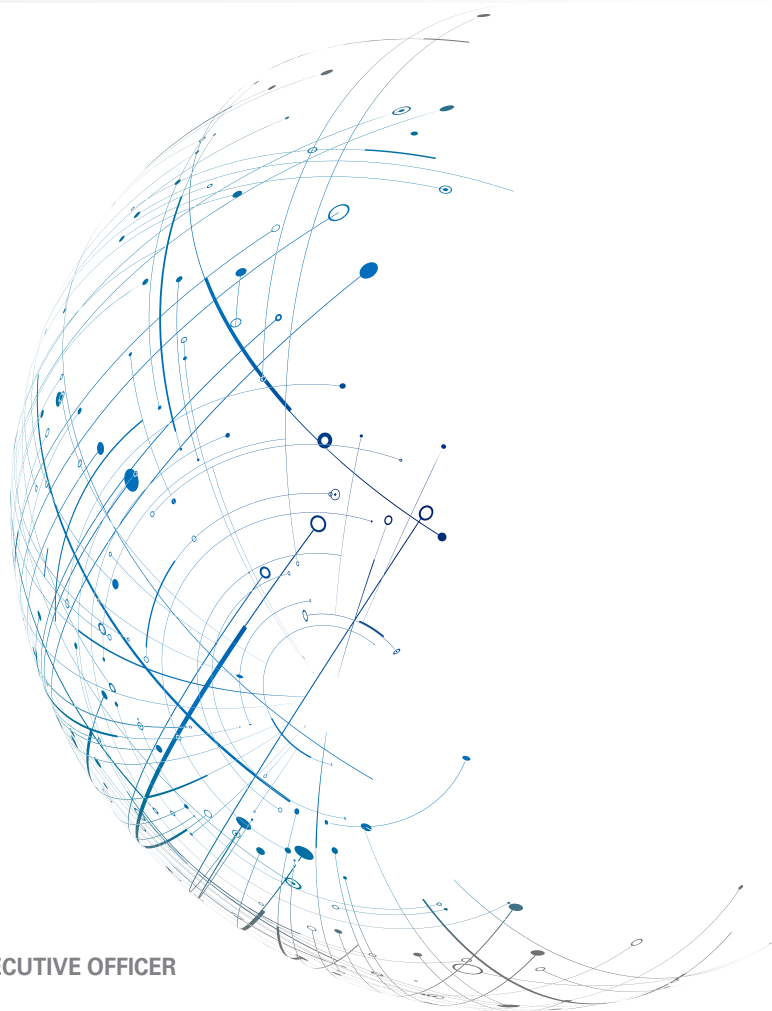


A Next Generation Business Model: Bridging The Gap In Support Of The Defense Industry



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Executive Summary

In a white paper published August 2016 we took a comprehensive look at how a Next Generation Business Model can be purpose-built to meet the challenges we and our allies face. Challenges requiring technologically robust defenses that are developed and deployed rapidly, and cost-effectively, to meet an ever evolving threat environment. In that paper (Meeting Today's Defense Challenges: Evolving Our Next Generation Business Model) we discuss emerging threats ranging from the Islamic State (ISIS), China, an unpredictable relationship with Russia, the on-going North Korean threat, Iran, and instability in the Middle East and Northern Africa. We then speak in some detail about the changing US defense procurement landscape as it relates to the Department of Defense and how a Next Generation Business Model approach can and indeed already is helping in that regard. That paper remains an excellent reference piece. You can view and/download a pdf of that paper by visiting www.mrcy.com/nextgen.

However, since the publication of that paper, much has changed.

- Geopolitical instability and uncertainty remain and in some instances have even increased;
- Long-standing institutions such as NATO, the European Union (EU), World Trade Organization, the UN, and others are struggling to deal with new challenges and in some circles their role in the world is being questioned;
- New political leadership in the United States brings new priorities and possible shifts in global politics;
- The new US President and Cabinet mean potentially different priorities and policies within the DoD.



A changing world order

Thesis: For all players in the defense industrial base to succeed they need to have a clear eyed view of world events, geopolitical trends and domestic challenges.

There is no way to say for sure how geopolitical events, government policymaking initiatives, and the overall complexion of the DoD will play out. However, we can say for sure that the landscape is shifting. As stated in a thoughtful piece in The Hill, a non-partisan inside the beltway publication reaching thousands of influencers and policymakers:



"Donald Trump has followed up on campaign promises.... Trump has emerged, somewhat incongruously, as both a defense hawk and a budget hawk, calling for vast increases in the military budget while criticizing waste, fraud, and abuse... "

The Hill piece goes on to say... "Trump's increases... could turn out to be very real. And he'll have some powerful allies on his side come April when his first budget request is expected to be released.



"Sen. John McCain (R-Ariz), chairman of the Senate Armed Services Committee, has put forth his own Trump-esque blueprint for a buildup. The paper, released in January, calls for \$640Billion in defense spending in fiscal year 2018...."



Finally in that same piece, The Hill notes that nothing is guaranteed... "Republicans- who have, in the past, favored greater defense spending may bristle at the prospect of a buildup the likes of which has not been seen since Ronald Reagan."

What is certain is that the assumptions, projections and expectations of recent years are mostly being questioned and in some cases dismissed altogether.

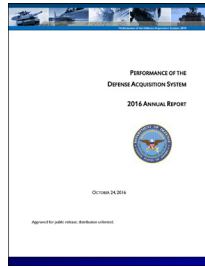
Progress is being made

Thesis: Defense acquisition reforms of the last few years have resulted in some real progress and cost savings. However, the underlying issues around how we develop, procure and deploy technology within the DoD have yet to be adequately addressed.

In our August, 2016 Next Generation Business Model whitepaper, we talk in detail about defense procurement reform. These reforms are, among other things, driving the need for the open systems architectures and pre-integrated subsystems demanded by the DoD in support of multiple platforms, programs and missions. The upshot is that there has been material progress in this area, although much work remains.

On October 24, 2016 the DoD issued its annual report on "Performance of the Defense Acquisition System." The report is over 200 pages long and far too detailed to summarize here, but some key points are worth noting:

- “Price, schedule and technical performance are key contract outcomes of interest”
- “Reliability”, “Maintainability” and “Survivability” remain the key levers to a successful outcome regarding key platforms and underlying technologies
- “Warfighting capabilities must not only have the needed technical performance but must be delivered in a timely fashion to address operational threats”
- “Increased demands for new capabilities can also add costs to contracts: that is visible... during the defense buildup in the 1980’s by President Reagan and during the post-9/11 wars to combat global terrorism”
- “BBP (Better Buying Power)-era drops are driven by declining development cost-growth rates”
- “Reduced cost growth in the BBP era may correlate with the requirement to identify and pursue Should-Cost savings and a renewed effort to improve contract incentives. The DoD has continued to see increasing savings on programs from Should-Cost initiatives in BBP. These savings have grown across the acquisition portfolio...”



competition in the marketplace, and the true transformation of the procurement workforce that is called for in all three BBP documents.

Further, there is an element of uncertainty around the DoD along with its corresponding priorities and approaches. New Secretary of Defense James Mattis has a military rather than a civilian background, a distinct departure from his most recent predecessors. Additionally, changes in leadership at AT&L and other operational units of the DoD create potential uncertainty in how defense acquisition and ongoing acquisition reform will be handled.



It is worth noting that General Mattis has had valuable civilian experience in addition to his distinguished military career, including service on the Board of Directors of General Dynamics and as an Annenberg Distinguished Visiting Fellow at the Hoover Institution. Time will tell how the DoD will be reshaped under his leadership.

The DoD and The Defense Industrial Base- An Incomplete Model

Thesis: The DoD and the Defense Industrial Base have made meaningful progress in driving acquisition reform, reducing costs and rising to increasing global challenges. Yet there remains a critical missing element rendering the complex matrix of contributors to our defense incomplete. Commercial investment in innovation can help bridge the gap in support of affordable technology innovation in defense.

The Pentagon and all elements of the armed services and their corresponding labs (NRL, AFRL and others), government sponsored labs like DARPA, and non-profit labs such as Lincoln Laboratory and Draper Laboratory, all contribute meaningful and actionable research and development.

The large prime contractors also invest a small percentage, typically between 2% to 3% of revenues, into internal R&D. While small as a percentage of sales, given the substantial annual revenues of the biggest primes, the investment is substantial and badly needed.

Still work to be done

Although there are some encouraging findings in the DoD 2016 Annual Report, the general program budget and acquisition environment is not all positive. The report noted above finds that “Cycle time—between the identification and fielding of a need... Continues to be an area of concern in our BBP initiatives and elsewhere.”

At the same time, members of Congress, such as Senate Armed Service Committee Chair McCain, and President Trump- still in the early days of his Commander- in- Chief role, continue to be critics of program costs and overall DoD procurement in key MDAPs (Major Defense Acquisition Programs). Finally, the 2016 DoD Annual Report, while providing a detailed cost analysis, is not able to draw any connection between “bending the cost curve” and continuing to drive innovation, competitiveness or quality.

In short, there is some evidence of cost containment under the three Better Buying Power initiatives of the last five years. However, the 200+ page DoD procurement report card is very transparent about the lack of linearity between BBP initiatives and the need to drive innovation,

Yet, given the increased global threats and relentless geopolitical uncertainty, this level of investment isn't sufficient to match the continuous need for more and better technologies at an ever-increasing pace. However, there is a missing component in support of the funding and development of technology capabilities and solutions supporting our nation's and our allies' defense. That missing link is the failure to fully leverage the enormous technology investment of commercially-oriented organizations that can be applied in support of the DoD. There are many commercial businesses that already support the defense industry, many of them primarily technology firms, and they as well as others, could become a much bigger part of the picture helping to fund and drive innovation moving forward.



A Layered Approach to Technology Investment

For perspective, think of how commercial technology companies approach technology development. In the commercial technology world organizations invest a substantial percentage of their annual sales into self-funded R&D. The data varies by year and even by quarter but here are a few examples: Microsoft 13%, Cisco 14%, Google 18%, Applied Materials 15%, Facebook 30%. Regardless of their age or technology focus, the internal investment in R&D is substantial.

An even more relevant example of a large technology participant is Intel, investing around 20% of its revenue in R&D - a high percentage. Mercury, in turn, often incorporates commercially available third-party technologies into its solutions, benefiting from on-going investment by those third parties. As we use others' microprocessing technologies, we then apply our own technologies and other innovations, supported by our own self-funded R&D investments. As a result, there is an enormous compounding effect as multiple enterprises are advancing multiple technologies into highly integrated solutions. All of this happens at little or no cost (or risk) to the government, yet provides significant support to our defense customers and end users. We ultimately build technologies that are designed specifically to meet the needs of the DoD, but we do so by leveraging commercially developed technologies, integrating these innovations directly into what we are doing for our customers.



Much like the companies noted above, Mercury currently invests between 12%-15% of its revenue annually into internal, self-funded R&D. Why? Stated simply, we do this for much the same reason as the global commercial technology companies mentioned above. It's the only way to succeed. We invest, or co-invest with our customers, in key technologies anticipating the evolving needs of the key defense programs and missions. As a commercial company, we have learned that we cannot survive let alone thrive with an R&D budget percent-

age in the low single digits of revenue. Just like the global technology organizations noted earlier, we have to innovate early and often. At our core, we are a technology company. Our end customers are for the most part defense industry participants, so our own investment in R&D is specifically designed to complement that of our customers. But the key is that we follow, and fund, a layered, commercial, technology development model.

Our thesis revolves around the fact that we believe the defense industrial base can and in fact does work, even if not perfectly. There is cutting edge work being done across the DoD, the primes, within the specific armed services and within both government and non-profit labs. However, tapping more efficiently into the vast potential investment of commercially based organizations like Mercury, the innovation and investment needed to fuel the exponential growth in much needed applied technology development could be significantly bigger. Mercury Systems is just a small part of the puzzle. Imagine though, if there were a thriving ecosystem of companies investing 12%-15% of their revenue in a sustained effort to address defense technology needs. The innovation being asked for by the Pentagon could happen faster, more affordably, and on a vastly greater scale than it happens today.

In addition, this could free up current government funding for supplemental work, helping to address other, or additional, defense priorities, or could be used for just plain savings. We believe Mercury Systems has, driven by customer needs, evolved a business model that works. It could also serve as a test bed for demonstrating how the commercial industrial base can be leveraged to support defense, and add momentum to the innovation engine. All of this would help ensure that we and our allies can meet the challenging times we face.

Mercury Systems' Next Generation Business Model

Thesis: Our Next Generation Business Model is gaining traction. We are just one Tier 2 supplier in a huge industry. However, we believe the defense industrial base can build a nimble, innovative, sustainable business model structure driving rapid, cost-effective applied technology innovation.

Our Next Generation Business Model speaks to a continuing challenge within the DoD and the overall defense industrial base. Very few companies, from large primes, to Tier 2 and Tier 3 providers of technologies, have found a way to invest significantly in internal R&D, while also profitably running their business. Why? The reasons are many but part of the answer lies in what was uncovered in the 2016 DoD Procurement Annual Report. While there is some evidence, although not conclusive, that the BBP initiatives have helped with cost containment, there is no evidence, conclusive or otherwise, that recent defense acquisition initiatives have fostered innovation, created a more competitive commercial environment, or helped make the US and our allies better prepared for the challenges that lie ahead. The reason, we believe, lies in the fact that DoD directives like BBP speak to driving innovation. However, the conversation around innovation, the drive for

open systems architectures and shared technologies, is not supported with a complementary way of operating to encourage such behavior. In fact, often the promotion of shared solutions and incenting open systems has created a “race to the bottom” where all members of the supply chain are driving to “should cost” budgets but forgoing the long-term objectives needed to drive both efficiency and profitability.

The challenge is, how can we ensure that the defense industrial base and the DoD can make it work across organizations, both government and commercial?

How Commercial Companies Approach R&D

Thesis: Commercial enterprises supporting the DoD can successfully undertake internal R&D efforts in a targeted way if the features and solutions are re-usable and portable across different platforms supporting a variety of missions.

Let’s think about how commercial technology-centric companies approach the problem. Like all companies, they have limited funds to spend on any effort they may undertake. No one hands them a set of specifications for what will be successful. The market, and particularly the market’s interest in potential products, is uncertain and can change rapidly. There is often a high degree of price sensitivity for whatever they seek to sell. Finally, the competition is relentless. As a result, companies focus on doing their homework, determining where the unmet technology needs may be and how they might be solved, investing carefully and pricing competitively. It also requires driving hard to innovate and stay ahead of the curve to avoid being overtaken by the next competitor. Against all this uncertainty, one might think that such companies would invest less, not more, for fear of never recouping their investment. Instead, as is evidenced by several of the technology companies mentioned earlier, they typically invest more heavily – and entirely at risk – in self-funded R&D. At the same time, they seek to leverage these investments across multiple opportunities in the hope of finding more ways to earn reasonable returns on their often large and risky investments, essentially spreading the investment risk across a portfolio of opportunities with the goal of earning upside if they enjoy success in multiple areas.

We leverage this self-funded R&D approach at Mercury Systems. Using our substantial, at-risk, investment in R&D, we build solutions that work successfully in support of key defense platforms. The approach is not without its failures, but it is by no means a shot in the dark. We minimize our overall investment risk, and by extension that of our customers, by making sure we build solutions that offer modularity, standardization, and where possible adhere to critical existing or emerging open systems architecture requirements. Unlike the technology companies mentioned earlier, our customers are largely defense focused. Yet the same logic applies for us as it does for them. Build innovative technologies that can be used and re-used effectively and be prepared to compete on value. Finally, we make sure we offer critical technology differentiation. Features that are built-in, not bolted on.

Thesis: There needs to be a way of taking technology investment theory and turning it into a reality. For us that connective tissue is a pragmatic framework that organizes our innovation into critical areas that in turn support our customer needs. Without such a framework, the bets being placed could be much riskier. Within a suitable framework, R&D investments become more manageable and more successful.

Pre-Integrated Subsystems and the “5s” model

One of the ways we have made our Next Generation Business Model work, satisfying our customers as well as investors, is that we can provide cutting edge technology solutions both rapidly and cost effectively, all while meeting critical schedule and technical requirements. A key to doing that is in providing what we refer to as pre-integrated subsystems.

Mercury is neither a platform provider nor an end integrator. We generally leave that to our customers, either large prime contractors or the government. We refer to these subsystems as being “pre-integrated”, which means they have all the needed technology elements, such as RF content, digital and/or secure processing, along with open middleware and other application ready software already built-in. The customer can then utilize this pre-integrated solution as an integral part of a new platform or to modernize an older platform. The requisite classified applications, government IP, electronic warfare and countermeasure techniques, or other elements can all easily be integrated on top of the pre-integrated technology solutions.

On top of this, we leverage the best and most recent commercially available technology and open systems architectures. The government has been asking, through multiple directives, for the use of modular open systems architectures for over 20 years. However, the defense industry has been slow to respond. Today with the multiple challenges we face, an increasingly uncertain world, and numerous strategic and tactical threats, the industry is now paying attention. Mercury has been driving open standards based solutions with the development and ratification of OpenVPX in 2010. Open VPX makes it easier and more cost effective to deliver innovations in support of key programs. More recently we have driven innovations in support of more standardization

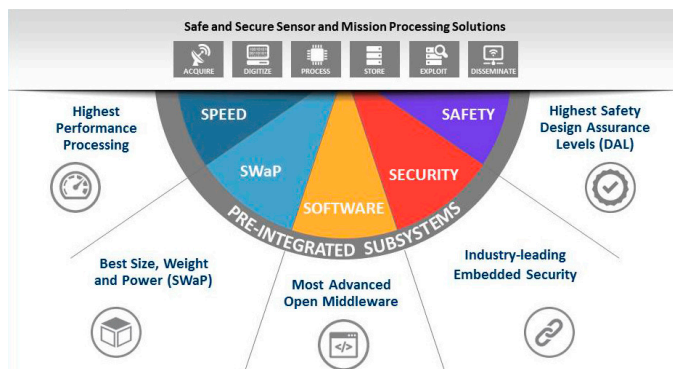


OpenRFM™ OpenVPX

in support of the growing requirements around building innovative and affordable EW solutions. That is why, in 2014, we launched the OpenRFM initiative. Since the announcement of Open RFM we have worked

with key customers to develop more standardized ways of building advanced EW technologies and solutions. Even though OpenRFM is not yet a ratified standard, it is already contributing to an environment where standardization in the RF realm and the combining of RF and digital innovations has become a realistic notion. All this supports our growing body of critical EW solutions.

We would not be able to develop solutions, from prototype to production, and affordably deliver pre-integrated solutions were it not for our unique 5s framework. This framework serves as an underlying foundation to help drive the way we invest in and deploy technologies for our customers.



Our 5s model is built around: Speed (for the highest performing processing), SWaP (best size, weight and power), Software (the most advanced open middleware), Security (industry-leading embedded security) and Safety with the highest safety assurance design levels (DAL). The 5s framework allows us to deliver everything from miniature RF transceivers and secure processing subsystems, to secure rack-mount servers and full RF and EW subsystems.



The 5s framework is what we use to build our product road maps and it creates a litmus test for what innovations we should move forward with and what should be shelved. If we can't find a home for an innovation within the 5s model, chances are it won't meet our needs or the needs of our customers. This creates a rigor, discipline and focus on delivering "innovation that matters" that is becoming a strong driver of our success and growth within the industry.

Conclusion

Thesis: Uncertainty both at home and abroad is the only constant. We believe a business model that accounts for this reality and provides for substantial investment in technology solutions is essential for our company's and our nation's success.

- **The political climate at home, and geopolitical instability abroad, call for a defense industry that is nimble and innovative**
- **Recent DoD reforms, while helpful, do not address the underlying problem of driving- and funding- rapid yet affordable applied technology innovation**
- **We believe the current system supporting the development and procurement of advanced technologies for our nation's defense is incomplete**
- **A Next Generation Business Model can help by driving investment and co-investment where it is needed most**
- **It is imperative to have a specific management system or framework to turn the theory of a Next Generation Business Model into reality**

About the Authors

Mark Aslett is Mercury's President and Chief Executive Officer and 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.

Gerald M. Haines II is responsible for all of the company's financial and corporate reporting functions. He has extensive experience in corporate finance, strategic planning and execution, investor relations, and mergers and acquisitions, and has held senior executive positions in publicly traded companies spanning industries from technology and telecommunications to alternative energy and manufacturing.

Mr. Haines joined Mercury in 2010 as Senior Vice President of Corporate Development. Prior to Mercury, he served as Executive Vice President at Verenum Corporation, a publicly traded company engaged in the development and commercialization of biofuels and high-performance specialty enzymes, where he played a key role in various corporate development, corporate finance and joint venturing activities. Previously, Mr. Haines served as Executive Vice President of Strategic Affairs of Enterasys Networks, Inc., a publicly traded network communications company, Senior Vice President of Cabletron Systems, Inc., the predecessor of Enterasys Networks, and Vice President of Applied Extrusion Technologies, a large manufacturer of plastic films and packaging. He began his career at J.P. Morgan.

Mr. Haines holds a bachelor's degree in Business Administration, magna cum laude, from Boston University, and a law degree from Cornell Law School.

About Mercury Systems, Inc.

Mercury Systems (NASDAQ:MRCY) is a leading commercial provider of secure sensor and mission processing subsystems. Optimized for customer and mission success, Mercury's solutions power a wide variety of critical defense and intelligence programs. Headquartered in Andover, Mass., Mercury is pioneering a next-generation defense electronics business model specifically designed to meet the industry's current and emerging technology needs. To learn more, visit www.mrcy.com.



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