



Fostering the Manufacturing & Defense Industrial Base of the Future



Manufacturing and Defense Industrial Base and Supply Chain Executive Order

On July 21, 2017, President Trump issued Executive Order 13806, *Assessing and Strengthening the Manufacturing and Defense Industrial Base and Supply Chain Resiliency of the United States*. The Executive Order recognizes “the ability of the United States to maintain readiness, and to surge in response to an emergency, directly relates to the capacity, capabilities and resiliency of our manufacturing and defense industrial base and supply chains.”¹ The Executive Order requires an interagency assessment of the manufacturing and defense industrial base and their supply chains with considerations of the following nature: single sources of supply, workforce skill gaps and access to goods and raw materials critical to national security.

AIA has been pleased by the demonstrated commitment and attention towards industrial base challenges at the highest levels of the Trump Administration. Based on initial commentary provided by officials in Department of Defense Office of Manufacturing and Industrial Base Policy responsible for leading the interagency assessment, strategic-level risks for the industrial base have been identified that align with longstanding AIA concerns:

- > The cyclical nature of defense spending and the impact of the Budget Control Act of 2011
- > The decline of overall manufacturing, both capability and capacity
- > The growing human capital gaps in the U.S. science, technology, engineering and mathematics (STEM) and trade-related workforce
- > The unintended consequences of DOD business practices
- > Industrial policies of competitor states working to erode our National Security Innovation Base

AIA and our member companies have consistently informed both DOD and Congressional leadership about these challenges in our advocacy. We hope the attention brought on by EO 13806 will establish the urgency needed to implement significant change.

Where are we today? At war for more than 15 years and facing spending constraints imposed by the Budget Control Act of 2011 (BCA), our armed forces – and our industry – have come under significant strain. Although the BCA’s cuts have been somewhat mitigated by Overseas Contingency Operations funding and short-term budget agreements, appropriations have been unpredictable and inconsistent. Despite the dedication of our troops and the noble work of our companies, neither the government nor the private sector can effectively operate under these conditions. It is no surprise that senior civilian and military leaders have publicly warned that they are struggling to maintain readiness and modernize capability.

In the words of Secretary of Defense James Mattis, “[N]o enemy in the field has done more to harm the readiness of the U.S. military than the combined impact of the Budget Control Act’s defense spending cuts, worsened by us operating, 9 of the last 10 years, under continuing resolutions, wasting copious amounts of precious taxpayer dollars.” The BCA has had tangible negative impacts across the Services on personnel, training and equipment. Only half of the Air Force’s combat forces are sufficiently ready for battle and its aircraft average 27 years old.² Over the last 10 years, the Marine Corps’ rate of mishaps resulting in loss of life or aircraft has doubled to 4.47 accidents per 100,000 flight hours and about 80 percent of Marine aviation units have an insufficient number of ready basic aircraft.³ Two ship collisions in the summer of 2017 resulting in several fatalities were directly linked to Navy budget constraints and insufficient training.⁴

What does the future hold? On January 19, 2018, Secretary Mattis published the *National Defense Strategy of the United States* (NDS), establishing long-term, strategic competition as the central challenge to the United States. Although the Executive Order preceded the NDS, its objectives largely align with its overarching challenge – to ready the United States for an era of great power competition.

The strategy also recognized several themes defining the security environment:

- > A resilient, but weakening post-World War II international order
- > Challenges to U.S. military advantage and contested environments in every domain (sea, air, land, space and cyberspace)
- > Rapid technological advancement and the changing character of war
- > Non-state actors with increasingly sophisticated capabilities
- > Realization that the homeland is no longer a sanctuary
- > Rogue nations continuing to pursue weapons of mass destruction⁵

¹ Exec. Order No. 13806, 82 FR 34597 (2017).

² Office of the Speaker of the House of Representatives. “Here’s Why We Need to Rebuild the Military.” (5 Jan 2018). Accessible at: <https://www.speaker.gov/general/here-s-why-we-need-rebuild-military>.

³ *Ibid.*

⁴ Committee on Armed Services, U.S. House of Representative. “Navy is ‘Treading Water.’” (8 Sept 2017). Accessible at: <https://armedservices.house.gov/news/defense-drumbeat/navy-treading-water>.

⁵ Secretary of Defense, U.S. Department of Defense. “Summary of the 2018 National Defense Strategy of the United States of America.” (2018) Accessible at: <https://www.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf>.

To counter such an environment, Secretary Mattis established three lines of effort: rebuilding military readiness as we build a more lethal force, strengthen alliances and attract new partners, and reform the Department for greater performance and affordability.⁶ The industrial base will support all three efforts by providing lethality tools to our warfighters, contributing capabilities to our allies and partners so they can fight with us, and by working with DOD to maximize acquisition efficiency.

AIA Efforts

As the voice of American aerospace and defense, AIA has long advocated for policies and budgets that strengthen aerospace and defense and grow the U.S. economy; improve U.S. aerospace and defense infrastructure and the industrial base; and achieve a level playing field for U.S. industry in the global marketplace. Specifically in response to Executive Order 13806, AIA established an Industrial Base Working Group comprised of senior industry thought leaders to serve as industry's main conduit of information and dialogue with DOD and other agencies. The group's work has focused on four pillars of the industrial base – (1) robust, balanced, and stable defense spending; (2) streamlined acquisition policy; (3) stewardship of key capabilities; and (4) a talented workforce. Within this framework, the group has worked to identify leading challenges and possible solutions in the context of current national security and acquisition strategy initiatives and policies. AIA is releasing these findings to coincide with and inform the ongoing manufacturing and defense industrial base and supply chain assessment.

New imperatives for the industrial base: Resilience, Innovation and Speed

The United States does not have a Soviet-style specified industrial policy, nor should it. Instead, both DOD and Congress need to understand and consider the impact of policy and budgetary decisions on the industrial base in the short- and long-term. Secretary Mattis has called for “streamline[d] rapid, iterative approaches from development to fielding” and to “provide the defense industry with sufficient predictability to inform their long-term investments in critical skills, infrastructure, and research and development,” to perform at the “speed of relevance.” In a conflict with a major power, there will not be time to surge or catch up technologically. Resilience, innovation and speed must be built into DOD process and the industrial base. To achieve this, we must balance the following priorities:

Efficiency vs. Resilience: There is a difference between a system that delivers at the lowest cost and one that supports resilience. Industry has made many tough choices regarding personnel, plant, equipment and purchasing to meet customer demands for efficiency, with increased DOD scrutiny of subcontractor margins and management, and on the supply chains of major programs. These efforts are focused on driving down costs, often with little regard for their impact on the ability of supply chains to surge or meet urgent or unexpected needs. These efforts by DOD to squeeze suppliers have forced dependency on fewer sources – and even foreign or sole sources – to fulfill cost objectives at a time when the industrial base has already constricted by budget cuts. DOD and Congress must understand that there is a price for resilience.

Risk Aversion vs. Innovation: Innovation requires risk taking. Current DOD acquisition strategies, policies and oversight regimes default to risk avoidance rather than risk management approaches, impeding innovation. Great power competition will require our armed forces to continue to push the technology envelope. Industry must be driven and rewarded for performance of capabilities and meeting warfighter needs, not insular process requirements, to support that mission.

Cost vs. Speed: Today's acquisition system is overly-focused on cost, not the timely delivery of capability. Years of decision-making based on cost has led to a race to the bottom. DOD needs to better incorporate the value of speed into requirements, acquisition decisions and oversight priorities. DOD and Congress need to reorient business practices towards speed. To support a resilient, innovative and responsive industrial base, the following four pillars and ten priorities must be addressed.

Pillar I – Robust, Balanced and Stable Defense Spending

The United States military relies on the vitality and ingenuity of the American free market system to provide the goods and services it needs to win. The foundation of a healthy manufacturing and defense industrial base is a consistent demand signal, with robust, stable and balanced budgets that enable the industrial base to align investments in research and development (R&D) and production facilities, and to secure their sources of supply to meet DOD's needs. Over the last several years, a combination of factors – most notably the BCA – have lowered aggregate defense spending, forcing our military to accept undesirable levels of risk in carrying out national security missions, delaying or cancelling modernization priorities, and driving inefficient spending practices that reduce DOD's overall buying power. In an era of great power competition, BCA spending caps will devastate the industrial base's ingenuity and surge capacity.

⁶ Ibid.

(1) Robust Budgets

A recent study conducted by the Center for Strategic and International Studies provided further details on the impact of the BCA and the defense drawdown on the industrial base. From FY10 to FY15, the number of prime vendors in the industrial base dropped from 72,600 to 61,700, while DOD contract obligations fell 23% during FY13-15 in comparison to the FY11-12 period.⁷ Specific portfolios saw even more drastic cuts or experienced whipsaw effects. While information and conclusions below the prime contractor level are difficult to obtain, AIA members indicate that the detrimental impact of budget cuts have been felt throughout the supply chain and are magnified for businesses with less capacity and diversification.

The consequences of decreased defense spending from the defense drawdown and BCA were compounded by the manner in which they were done – through overall spending cuts rather than informed investments and tradeoffs to achieve savings. DOD delayed modernization in favor of incremental upgrades to existing systems; decreased readiness by deferring maintenance; and cut force structure. In response to this behavior, industry has been forced to value short-term efficiency and cost savings over long-term investment and resilience. Now, with an agreement for increased defense spending for fiscal years 2018 and 2019, DOD must rebuild readiness and force structure and make down payments on previously deferred modernization efforts, all at the same time.

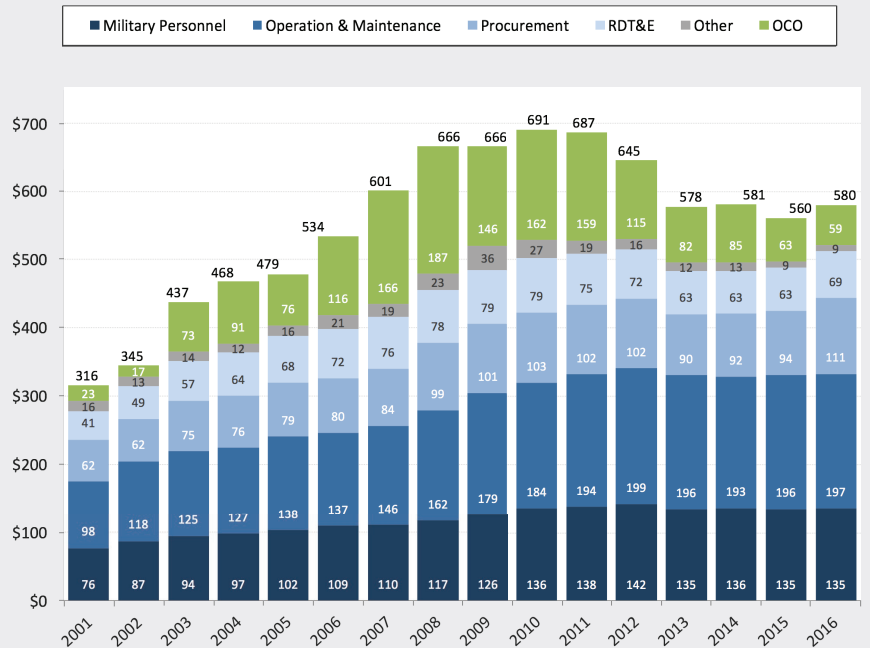
(2) Stable Appropriations

The breakdown in regular order within the Congressional budget process has made these conditions even worse. Although lapses in appropriations and use of continuing resolutions (CR) are not new – CRs have been utilized in 36 of the last 40 years – the average number of days spent under CRs for DOD has increased to 125 in the FY10-FY17 timeframe.⁸ These have been more disruptive to DOD than other agencies because of the nature of DOD purchases – about half of DOD’s budget is typically spent on the purchase of goods and services, with significant portions dedicated to large, capital-intensive and multi-year programs. CRs and shutdowns have resulted in outright waste, disrupted major programs at key milestones and driven inefficient spending practices at DOD by decreasing time to obligate new funds. These effects have had demonstrable impacts on the industrial base, which are magnified at lower tiers of the supply chain.



DEPARTMENT OF DEFENSE DISCRETIONARY BUDGET AUTHORITY BY SELECTED TITLE

Fiscal Years 2001-2021
(In Billions of Dollars)



Source: Aerospace Industries Association (AIA), based on data from the Department of Defense, *National Defense Budget Estimates For FY2017, Tables 2-1 and 6-25*.

Notes: All enacted war and supplemental funding is included.

Discretionary budget authority expressed in current dollars.

a Includes military construction, family housing, revolving and management funds, and trust, receipts, and other.

OCO = Overseas Contingency Operations.

RDT&E = Research, Development, Test and Evaluation.

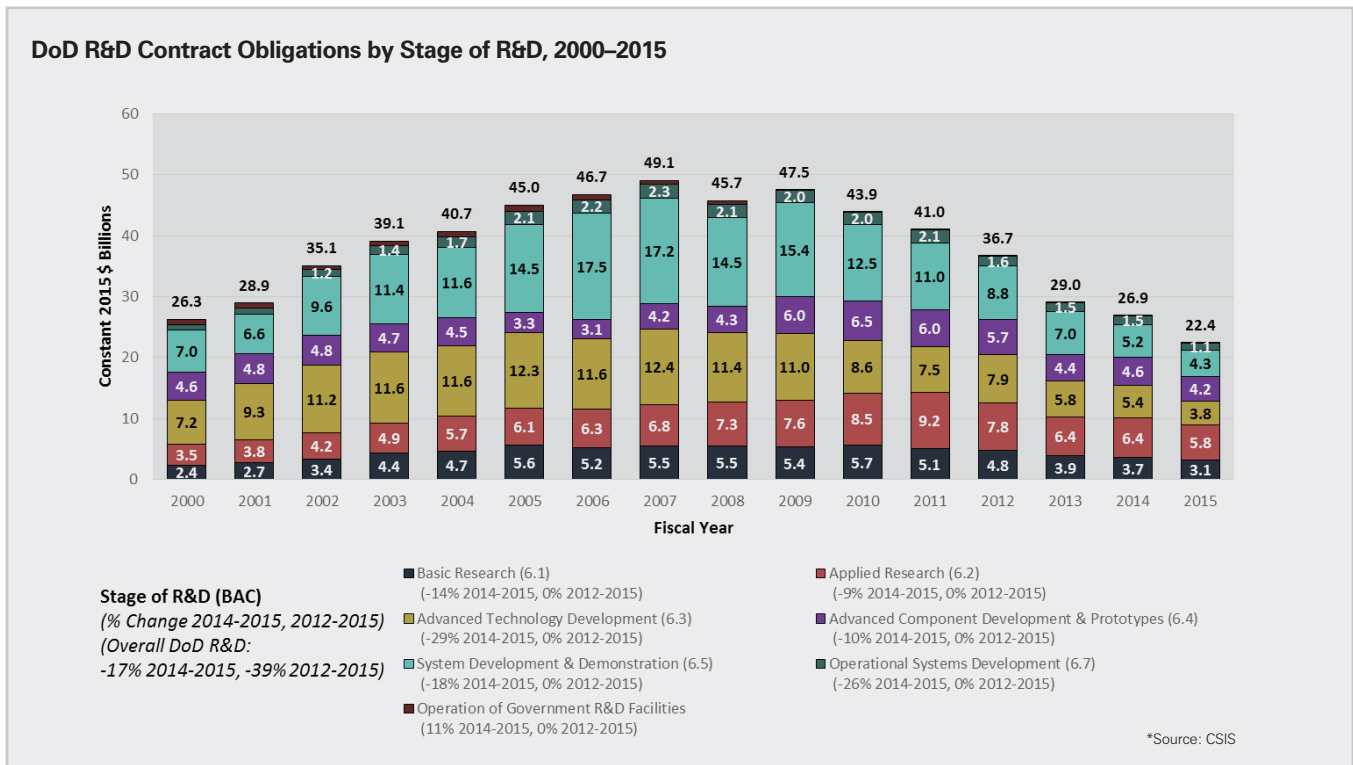
⁷ McCormick R., Hunter A., and Sanders G. "Measuring the Impact of Sequestration and the Drawdown on the Defense Industrial Base." (December 2017). Center for Strategic and International Studies. Accessible at: <https://www.csis.org/>.

⁸ Williams L. and Roscoe J. "Defense Spending Under an Interim Continuing Resolution: In Brief." (23 Feb 2018). Congressional Research Service, R44636.

(3) Balanced Funding

Along with aggregate defense spending cuts, there have also been disproportionate reductions to DOD’s Research, Development, Test and Evaluation (RDT&E) and Procurement accounts, which by nature and historical experience are most vulnerable to cuts. A 2015 report from the Center for Strategic and International Studies on DOD R&D contract obligations characterized the period from 2009 to 2015 as a six-year trough in the development pipeline for major weapons programs.⁹ While early-R&D efforts were largely preserved as a portion of overall R&D spending, the period saw disproportionately greater cuts to later-stage R&D from budget constraints, program delays and program cancellations. Critical workforce talent in design and systems engineering within the industrial base cannot be maintained without sufficient RDT&E funding and new starts.

Senator Lindsey Graham (R-SC) paraphrased former Vice President Dick Cheney in opposition to sequestration, saying “[defense spending is] not a spigot you turn on and off ... you need to keep money flowing in a predictable way so you can plan for the next war.”¹⁰ In that vein, cuts to RDT&E shrink the pipeline for new programs, so even with a short-term budget agreement in place, DOD needs several more years of robust, balanced and stable budgets to recover from BCA cuts.



Recommendations:

- > **Repeal BCA (as amended) caps for defense spending:** DOD needs at least 5% annual growth above inflation to fulfill the NDS. Within that figure, RDT&E and Procurement accounts at minimum should remain stable as a percentage of overall DOD spending.
- > **Leverage smart procurement practices to increase DOD buying power and support industrial base health:** Use of lot buys and multi-year procurements yield significant savings for the government and enable greater predictability and efficiency for contractors and their supply chains.
- > **Support long-term R&D and infrastructure investments:** Current DOD test ranges and facilities have insufficient capability and capacity to meet DOD’s desires for increased prototyping and experimentation activity, nor testing and evaluation of new technologies. For instance, the Director of the Defense Advanced Research Projects Agency recently called for increased funding to support test infrastructure for hypersonic missiles, noting such tests are only performed at one facility.¹¹ Further, to commit significant independent research and development (IR&D) funds, industry must know that significant capital-intensive infrastructure investments in support of new technologies and defense-unique capabilities will yield sufficient returns.

⁹ Ellman J. “Defense ‘Seed’ Corn R&D Preserved in 2015.” (28 Mar 2016). Center for Strategic and International Studies. Accessible at: <https://defense360.csis.org/defense-seed-corn-rd-continues-preserved-2015-trough-weapons-systems-development-continues/>.

¹⁰ Investor’s Business Daily, “Editorial: Dick Cheney For The Defense: Stop Dangerous Cuts.” (18 July 2018). Accessible at: <https://www.investors.com/politics/editorials/cheney-fights-automatic-defense-cuts/>.

Pillar II – Streamlined Acquisition Policy

DOD's acquisition system is largely rooted in Cold War-era thinking and processes, with an oversight regime oriented towards reducing cost. Today's security environment features threats in every domain from a variety of actors and decreasing cycle times for technologies dispersed across the globe. If America is to compete against economic peers, our acquisition system must be driven by national security objectives, not limit them. We must begin to value speed and innovation over cost.

(4) Reforming the contracting process

The clearest validation for this priority is that DOD has repeatedly and successfully pursued efforts to circumvent its own acquisition system and cultural norms by creating specialized or rapid acquisition offices. These offices are still governed by the DOD 5000 Series, yet can leverage other transaction authorities and streamlined oversight structures. AIA recognizes the need for special authorities to fulfill urgent operational needs; however, our national defense will be best served by streamlining the entire acquisition system. This requires a concerted reform effort and enduring commitment from Congress and DOD to apply lessons learned from streamlined acquisition structures and procedures throughout the entire system.

DOD and Congress also need to consider the compounding effect on the industrial base and supply chain of budget austerity and cost-based acquisition policies. Some acquisition practices aimed at controlling cost have merely established non-valued-added bureaucratic requirements, tied up cash flow, erected barriers to commercial technology and investment, and imposed a de facto lowest price, technically acceptable environment. Each of these trends serve to restrict the competitiveness of the supply base, crowd out and tie up resources for investment in R&D, personnel and facilities in government and industry, and discourage new entrants and independently-funded technologies from being offered to DOD.

Shortening Acquisition Timelines

AIA supports Under Secretary of Defense for Acquisition and Sustainment Ellen Lord's recent statements in support of reducing acquisition timelines by 50%. Lengthy timelines from solicitation release to contract award drives costs for government and industry, and has significant implications for supply chain competitiveness and health. Industry incurs costs to maintain idle personnel, plant and equipment, and government may need to award bridge contracts or find additional sources of goods and services to fill customer needs. In industry, these costs reverberate down the supply chain, where they are magnified for lower tier suppliers that cannot afford to absorb these costs – driving companies not to bid or exit from the defense marketplace altogether. These delays are especially frustrating in the case of sole source awards, follow on awards and for commercial items and services where the terms, conditions and price are clear-cut. Poorly-communicated contract requirements and transactional oversight requirements that devalue speed and customer satisfaction are leading causes of delays. DOD has the capacity and authority to improve these processes. All that is left is implementation and execution.

Over the last few months, AIA has provided Under Secretary Lord several recommendations that could be implemented immediately to support her efforts to cut acquisition timelines in half. We also have provided specific examples of challenges industry faces from the risk averse behavior of acquisition workforce and recommendations to support her initiatives to improve the acquisition workforce. Some examples of this behavior include: imposing requirements and flow downs that are inappropriate given the contract type; reviews of prime contractor commercial item determinations for their subcontractors even if they have an approved purchasing system; and after-the-fact DCAA audits of payments that are captured in real time by commercial auditors performing audits for financial statements.

Defense Contract Audit Agency (DCAA) Shortcomings

DCAA's audit backlog and the overall misalignment of DCAA's mission has had significant implications for the industrial base, contracting officers and – most importantly – the timely delivery of capability to our warfighters. In 2009, DCAA altered its mission and began to make taxpayers, rather than contracting officers, its customers. This taxpayer focus has led DCAA to pursue a standard of perfection (risk avoidance) over reasonable assurance through material judgement (risk management), along with untimely, poor-quality and infrequent audit products and business system reviews that undermine contracting officers' stewardship of taxpayer dollars. Every dollar spent on duplicative, non-value-added and untimely audit work presents an opportunity cost that could instead support lethality and force structure in DOD, and investment in personnel, plant and equipment for industry.

¹¹ Kheel R. "Russia, China eclipse US in hypersonic missiles, prompting fears." (27 Mar 2018). The Hill. Accessible at: <http://thehill.com/policy/defense/380364-china-russia-eclipse-us-in-hypersonic-missiles-prompting-fears?userid=280812>.

Costly and Duplicative Audit and Oversight Processes

Without an experienced, trained and empowered acquisition workforce, efforts to improve the defense acquisition system will be in vain. Risk aversion within the workforce is a symptom of an acquisition process buffeted by competing interest groups within the executive and legislative branches of government, and the imposition over decades of well-intentioned oversight meant to reduce risk in one or another part of the process. Unfortunately, these piecemeal actions are usually taken without full consideration of systemic impacts, leading to insular, duplicative and non-value-added processes divorced from overall program performance. Such process-based and transactional approaches have driven a culture of risk avoidance rather than risk mitigation, with detrimental impacts on speed, lethality and innovation.

Regulatory Reform

AIA is optimistic that the Advisory Panel on Streamlining and Codifying Acquisition Regulations, better known as the Section 809 Panel, will make significant progress in identifying statutory and regulatory requirements that do not contribute to the mission of the defense acquisition system. Under Executive Orders 13771 and 13777, Regulatory Reform Task Forces have been created within each agency to review all regulations and more rigorous standards have been installed for promulgating new regulations. Further, several key acquisition reforms are contained within the National Defense Authorization Acts from Fiscal Years 2016 through 2018. Taken together, these initiatives provide DOD the opportunity to unleash enormous innovation, flexibility and speed in the procurement of vital defense capabilities.

New blanket regulatory requirements and reviews have created a bottleneck of regulatory cases that has stymied the implementation of key reform efforts. DOD should identify which acquisition regulations are necessary to fulfill its mission in support of national defense – and eliminate those that do not – to reduce regulatory burdens on the public. Absent more liberal use of class deviations and national security exemptions from EO 13771 requirements, DOD's acquisition system will not be able to adapt, nor perform at the speed of relevance.

(5) Improved DOD-industry dialogue to encourage innovation

AIA welcomes Deputy Secretary of Defense Patrick Shanahan's recent memorandum, *Engaging with Industry*, instructing DOD to optimize relationships with industry to drive higher performance. The memo also identifies the many benefits of proactive government communications with industry, including "[to] establish policies and business practices that promote the long-term viability and competitiveness of the industrial base supporting defense" within legal and ethical boundaries.¹² The Office of Federal Procurement Policy's *Mythbusters* series of memoranda for the acquisition workforce likewise has attempted to correct popular misconceptions about communications with industry within the acquisition process. Communication must be a two-way street. Both parties should be held accountable for approaching engagements with openness and taking follow-on actions. Communication is also critical for government to understand the implications on innovation and the industrial base of their acquisition strategies and contracting procedures for specific procurements.

Intellectual Property and Investment in Innovation

Properly valuing and rewarding intellectual property (IP) is crucial to incentivizing industry investment and accessing new suppliers at the prime and subcontractor-level. DOD's requirements for technical data and software rights, acquisition strategies and product support strategies often run counter to overarching DOD policies on innovation, such as blanket requests by DOD for government purpose rights for data and software, de facto lowest price, technically acceptable source selection through evaluation criteria rewarding offerors who are more willing to part with their (and their subcontractors') technical data rights and rogue contract clauses requiring technical data beyond the scope of existing regulation. These and other government practices provide little incentive to bring new technology to DOD.

Intellectual property is a company's 'crown jewels.' Industry's incentives for investment in R&D is correlated with their ability to protect the rights to data and software produced and their return on investment from goods and services sold using that IP. Too often government does not clearly communicate with industry what technical data is needed for a program and why it is needed – rather relying on blanket requests that serve neither party well. DOD needs to establish an overarching strategy for IP that ensures its workforce is asking for the right IP for the right reasons based on a program's acquisition strategy and sustainment considerations. This strategy also needs to take into consideration how new acquisition strategies and approaches to IP impact industry's incentive to innovate and their overall business model. With the introduction of additive manufacturing and other new technologies, this strategy will be more and more valuable.

¹² Shanahan, P. (2018, March 2). *Engaging with Industry* [Memorandum]. Washington, DC: Department of Defense.

(6) Synchronize defense and commercial aerospace trade policies to support industrial base health

A recent AIA-Avascent study projects that 2017's \$400 million market for large unmanned aerial systems will grow to \$30 billion by 2036.¹³ Within that same time frame, Boeing's current market outlook projects deliveries of 41,030 commercial airplanes with a \$6.1 trillion market value.¹⁴ Those projections will hopefully add to the \$86 billion trade surplus the aerospace and defense industry achieved in 2017.

Unfortunately, too often the ramifications of commercial trade policies and practices for national defense are not fully considered and understood. Major contractors rely on a global supply chain, and their suppliers rely on domestic and foreign sales. Actions taken on commercial trade issues affect the competitiveness and resiliency of U.S. industry, and U.S. government export review processes undermine sales of U.S. defense products abroad. The primary purpose of defense trade is to strengthen alliances and attract new partners, with secondary benefits of strengthening the industrial base and enabling DOD to leverage greater economies of scale. The defense sector faces a fragmented interagency review process for potential sales and technology release, and lacks the advocacy and support foreign governments provide to their domestic industries. These issues undermine security cooperation objectives and the competitiveness of U.S. industry.

The deviation of government buying practices from commercial best practices further limits DOD's ability to tap into commercial innovation and private R&D investment. Senior DOD leadership and Congress continually endorse buying commercial products, yet at the same time have continued to impose government-unique requirements and procedures. The implications for the industrial base are profound. Government-unique requirements drive companies to avoid the DOD market entirely, not to bid on DOD contracts, or exit the defense market, thereby restricting competition throughout the supply base. Ironically, these costs likely outweigh the cost, schedule and performance risks of doing business with commercial suppliers in the first place.

Recommendations:

- > **Reorient oversight and compliance practices from existing transactional approach to one that operates on a systemic basis:** Utilize risk-based, materiality-driven approaches to auditing with increased reliance on approved contractor business systems and existing corporate financial oversight requirements (e.g., SEC quarterly and annual reporting) to the maximum extent possible.
- > **Streamlining acquisition process by tailoring oversight requirements to risk:** These requirements should leverage systemic controls as much as possible. Also, DOD should establish cutoff dates for the submission of cost and pricing data, institute firm timelines for audit products and remove barriers to the utilization of long term agreements. DOD should reinforce its broad goal to reduce the time between solicitation release and contract award with specific performance metrics in areas such as timeliness of DCAA audits and the time it takes to definitize undefinitized contractual actions.
- > **Exempt statutory acquisition reforms from EO 13771:** Reforms enacted through annual National Defense Authorization Acts should be considered "regulations issued with respect to a military, national security, or foreign affairs function of the United States," and therefore exempt from new regulatory procedures. This would not interfere with the Administration's goal of limiting new regulations promulgated under agency action.
- > **Establish an overarching DOD strategy for Intellectual Property:** DOD needs a strategic approach to IP that fully considers acquisition practices, contractor business models and sustainment priorities.
- > **Support and protect industry IR&D efforts:** The merit of each IR&D project should be determined by its intent rather than its outcome, bearing no consequence for later contract offers. DOD should leverage existing incentives in the defense marketplace and focus solely on setting and communicating demand signals.
- > **Unleash industry investment through contract terms and financing:** DOD should immediately implement ongoing regulatory cases that promote performance-based payments over progress payments and incentivize DOD to swiftly definitize undefinitized contractual actions. Further, longer term contracts, in lieu of short periods of performance to increase generic competition, are needed to incentivise desired levels of industry investment. Competition is a *means* to achieve greater performance; competition for the sake of competition is counterproductive.
- > **Promote mechanisms for government-industry communication throughout the lifecycle:** Specifically, DOD should focus on the sharing of long-term technology roadmaps, threat information and opportunities for industry exchanges with operator communities.
- > **Implement a National Security Cooperation Strategy:** The strategy should focus on identifying broad security cooperation priorities derived from the NDS, streamlining technology review and contracting, and promoting American competitiveness.
- > **Monitor and address the impact of commercial trade agreements and policies on the defense industrial base:** DOD must have a voice in relevant reviews and decisions as a representative of the defense industrial base.

¹³ Aerospace Industries Association and Avascent. "Think Bigger: Large Unmanned Systems and the Next Major Shift in Aviation." (26 Feb 2018). Accessible at: <https://www.aia-aerospace.org/report/think-bigger-large-unmanned-systems-next-major-shift-aviation/>.

¹⁴ The Boeing Company. "Current Market Outlook: 2017-2036." (2017). Accessible at: <http://www.boeing.com/resources/boeingdotcom/commercial/market/current-market-outlook-2017/assets/downloads/cmo-2018-3-20.pdf>.

Pillar III – Stewardship of Key Capabilities

The National Defense Strategy identifies several new technologies – advanced computing, big data analytics, artificial intelligence, autonomy, robotics, directed energy, hypersonics and biotechnology – that “ensure we will be able to fight and win the wars of the future.” These and other technologies will enable new concepts of operations and capability for warfighters and improved business operations within DOD. Understanding the potential and dangers of new technology and its rapid pace of development, will require dynamic, risk-informed management and acquisition practices.

(7) Adapting business processes by embracing digital transformation

Digital transformation extends far beyond weapon systems and networks and will revolutionize business processes and operations for DOD and its supporting industrial base. With this expansive and disruptive potential, new policy, political and cultural challenges will need to be identified and addressed. For instance, a future environment in which the DOD logistics and sustainment enterprise can (1) utilize additive manufacturing to produce spare parts on demand, (2) use big data to inform preventative maintenance, and (3) equip maintainers supported by powered exoskeletal suits and augmented virtual reality headsets to instruct repairs, will revolutionize infrastructure and human capital requirements and the supporting industrial base.

(8) Fostering innovation technology and processes

Despite attention from DOD leadership on commercial technology and innovation hubs in Silicon Valley, Austin and Boston, the fact remains that critical defense-unique technologies and applications are essential for the most advanced military capabilities. Under Secretary Lord and Under Secretary of Defense for Research and Engineering Michael Griffin have specifically highlighted offensive and defensive cyber, hypersonics and access to trusted microelectronics as focal areas for DOD. In these areas specifically, Chinese and Russian industrial policies are major challenges.

A 2017 report from the President’s Council of Advisors on Science and Technology details Chinese efforts through subsidies, IP theft, forced technology transfer, collusion and forced purchases of domestically-produced semiconductors as part of a Chinese policy “to be at an ‘advanced world-level [semiconductor capability] in all-major segments of the industry by 2030.’”¹⁵ Although public details are limited, officials at the highest levels of DOD have repeatedly warned about Russian and Chinese investments, infrastructure and tests in hypersonics; Vice Chairman of the Joint Chiefs of Staff General Paul Selva has acknowledged that the United States has lost its technological superiority in hypersonics.¹⁶ Further, Russian advances in electronic warfare displayed in operations in Ukraine and Syria, and indications that China is pursuing electronic warfare as a strategic priority, will require DOD to prioritize countermeasures meet these challenges in the electromagnetic spectrum.

Each of these capabilities require defense-unique investment and solutions and a resilient and innovative supply base. Trusted microelectronics and hypersonics respectively require intensive investment in foundries and infrastructure – especially test facilities – that cannot be recouped outside of DOD. In these areas industry will largely rely on IR&D funds, which support industrial base health and national security objectives by enabling industry to take risk on defense-unique solutions. DOD should remove any barriers that directly or indirectly limit industry’s ability to flexibly utilize IR&D and earn sufficient returns on those investments.

Recommendations:

- > **Utilize standards-based approaches and appropriate acquisition models to leverage new technologies:** Static, FAR-based approaches will serve as a barrier to acquiring new technologies. Acquisition-as-a-service models and adoption of commercial standards in areas such as cyber and internet of things are examples of how this should be done.
- > **Set clear guidance on responsibility for resiliency of key capabilities:** Maintaining surge personnel, plant and facilities in case of conflict comes at a cost. DOD needs to develop clear guidance on how considerations for resiliency and for critical defense capabilities like hardened microelectronics, should be incorporated in source selection.
- > **Leverage public-private partnerships and foster industry-university relationships in support of key capabilities:** DOD should ensure that their various programs and partnerships are aligned to support strategic, long-term technology roadmaps and priorities.

¹⁵ President’s Council of Advisors on Science and Technology, Executive Office of the President. “Ensuring Long-Term U.S. Leadership in Semiconductors.” (January 2017) Accessible at: https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/PCAST/pcast_ensuring_long-term_us_leadership_in_semiconductors.pdf.

¹⁶ McLeary P. “China Loves DOD Acquisition Culture, Says R&D Chief Griffin; He Loves Hypersonics.” Breaking Defense. Accessible at: <https://breakingdefense.com/2018/03/china-loves-dod-acquisition-culture-says-r/>.

Pillar IV – A Talented Workforce

The aerospace and defense industry boasts a workforce of 2.4 million people in the United States. These are high-skill, high-wage jobs, but industry still faces challenges recruiting and retaining the best available talent. According to Deloitte, by 2025, workforce skills gaps will leave as many as two million jobs unfilled across the entire manufacturing sector.¹⁷ Overall, 82% of manufacturers across all industries report that talent shortages will have a moderate or extreme impact on production levels to meet customer demand.¹⁸

Key trends challenging the aerospace and defense industry include shortfalls in STEM talent and trade skills, an aging workforce and increased competition from commercial industry. These trends are compounded by DOD's 'lowest price technically acceptable' environment – making it difficult to hire the best personnel and reward their ingenuity – as well as by recent deferments and long durations between modernization of major systems.

(9) Invest more in STEM education to develop critical skills

According to a recent survey by the Pew Research Center, only a third of workers aged 25 or older with a bachelor's degree earned it in a STEM field, while a majority of adults believe these degrees are not pursued because they are too difficult.¹⁹ Another study found that the vast majority of full-time students pursuing graduate degrees in key technology fields were international students unable to obtain security clearances, including 81% of electrical engineers, 79% of computer scientists, 62% of mechanical engineers and 55% of metallurgical/materials engineering students.²⁰ With diminishing interest among American students, the defense industry must compete with commercial companies for a shrinking pool of candidates.

Just as defense spending has shown signs of increases and several major programs are coming into fruition, there is an impending wave of retirements in industry. In 2015, 24% of hourly manufacturing employees and 18% of aerospace engineers in the aerospace industry were eligible for retirement.²¹ If hiring is not able to keep pace with the rate of retirement, industry will be unable to leverage the knowledge and experience of its existing workforce to train and educate the next generation of workers. This is especially true in specialized disciplines requiring both on-the-job training and years to achieve subject matter expertise.

A dearth of new programs, and gaps in production between major programs, pose further challenges. For example, some ship builders would require workforce increases to ramp up and sustain higher production rates, while others require additional capital investment in infrastructure. Conversely, if production rates are slowed or gapped, hot production lines and supply chains quickly turn cold and result in decreased production learning, loss of skilled workers, significantly increased cost and longer production schedules. The same holds true for aircraft development, where a gap in next generation programs will lead to an erosion of critical design and engineering skills.

(10) Modernize and accelerate the security clearance review process

The backlog of security clearance investigations currently stands at 710,000 cases. While AIA generally supports additional resources for the federal agencies involved, additional funding will only be a band-aid on a process that needs an end-to-end overhaul. There needs to be a broader strategic discussion on how the United States governs access to classified information that more appropriately balances risk with the imperative for reversing our eroding technical edge.

Delays in processing new background requests have further exacerbated the aerospace and defense industry's workforce challenges. The time it takes between hiring decisions and onboarding is a particular problem for our industry. During that time, new hires cannot begin working and have limited options for other means of income – making them vulnerable for poaching from commercial industry, which enjoys faster hiring timelines. Challenges in getting qualified personnel cleared imposes an increasing cost premium. This drives up costs for labor intensive R&D and production efforts and hampers the ability of smaller companies to hold on to their talent. Even though clearances do not expire, clearance holders must go through periodic reinvestigations on 5-year intervals based on classification level, further adding to the backlog. Government should leverage the impending transfer of DOD background investigations back to DOD to streamline clearance and suitability standards and modernize systems to take advantage of continuous evaluation techniques.

¹⁷ Giffi, Craig, et al. "Help Wanted: American Manufacturing Competitiveness and the Looming Skills Gap." Deloitte Review, Issue 16, 2015. Accessible at: https://www2.deloitte.com/content/dam/insights/us/articles/manufacturing-skills-gap-america/DR16_help_wanted.pdf.

¹⁸ Aerospace Industries Association. "The Defining Workforce Challenge in U.S. Aerospace & Defense: STEM Education, Training, Recruitment & Retention." (26 Sept 2016). Accessible at: <https://www.aia-aerospace.org/report/the-defining-workforce-challenge-in-u-s-aerospace-defense/>.

¹⁹ Kennedy B., Hefferon M., and Funk C. "Half of Americans think young people don't pursue STEM because it is too hard." (17 Jan 2018) Pew Research Center. Accessible at: <http://www.pewresearch.org/fact-tank/2018/01/17/half-of-americans-think-young-people-dont-pursue-stem-because-it-is-too-hard/>.

²⁰ National Foundation for American Policy (NFAP). "The Importance of International Students to American Science and Engineering." (October 2017). NFAP Policy Brief. Accessible at: <http://nfap.com/wp-content/uploads/2017/10/The-Importance-of-International-Students.NFAP-Policy-Brief.October-20171.pdf>.

²¹ Wyman O. "The Storm on Aviation's Radar: How to Reroute the Young Into the Aviation and Aerospace Workforce." (2014).

Recommendations:

- > **Promote the aerospace and defense industry:** Companies lack the resources to go beyond local initiatives to fulfill their specific needs. DOD should support industry partners through messaging and public affairs efforts to highlight the ingenuity and patriotism of the aerospace and defense workforce and available opportunities.
- > **Enhanced government and industry support of STEM education:** Government should utilize the industrial base assessment as an opportunity to garner public support for funding STEM-related programs and initiatives. Similarly, industry has a responsibility to continually promote and foster programs in support of STEM education and development.
- > **Incorporate workforce considerations into acquisition strategies and contracting decisions:** Failing to do so increases costs to the government and undermines industry's resiliency and capacity to meet urgent needs.
- > **Ensure sufficient and separate funding for OPM and DSS:** Funding and personnel should not be taken from OPM to support DOD. Process reforms and standing-up DOD's capacity to perform the background investigation mission should not preclude work on the existing backlog.
- > **Modernize the security clearance process:** This requires: (1) streamlined clearance standards to support a streamlined investigations process and promote reciprocity; (2) a single system of record that accepts reciprocity; (3) an updated, technologically-enabled investigation and re-investigation process that leverages continuous evaluation and allows industry to support government with the collection and transmittal of digital information; and (4) prioritization of investigations and adjudications of mission critical clearances.

Keeping Momentum

To operate in the current and developing security environment, our armed forces need the support of an innovative and resilient industrial base that can deliver at scale and with speed. AIA is optimistic that the Executive Order will help bring much-needed change to long-recognized problems. We have been pleased to support DOD by hosting several sessions for government to brief industry on its ongoing assessment and gain valuable feedback from our members in the areas of Aircraft; Radar and Electronic Warfare; Space; and Munitions and Missiles. We look forward to continuing this critical dialogue as the next stages of the industrial base assessment unfold.

President Trump's Executive Order has come at a critical time and we applaud his decisive action on behalf of our industry. These issues are not just about supporting American jobs and the economy – our defense industry enables us to achieve peace through strength by providing our armed forces capabilities to deter conflict and to win decisively on the battlefield. Our nation has entered an era of great power competition in which there will not be time to 'play catchup' or surge to meet our warfighters' needs. We must stay ahead – with streamlined acquisition regulations, a talented workforce, stewardship of certain specialized capabilities and a sustained high demand signal from DOD, we can.