

**Spring 2015  
Industry Study**

**Final Report  
*Weapons***



**The Dwight D. Eisenhower School for National Security and Resource Strategy**  
National Defense University  
Fort McNair, Washington, D.C. 20319-5062



# WEAPONS 2015

**ABSTRACT:** The Department of Defense finds itself at the nexus of declining defense budgets, significant requirements for modernization, ongoing conflicts, and continued requirements for highly ready forces enabled by technologically superior weaponry. Significant attention has been given to governmental policies designed to protect the taxpayer from unreasonable costs associated with defense procurements, and to rules and regulations that protect the US technological advantage from being distributed to other nations which might use that knowledge to weaken US military capability. Little governmental attention has been given to enabling the competitive atmosphere and robust market competition that would strengthen and secure a defense industrial base advantage vis-à-vis our competitors. Focused Research, Development, Test, and Evaluation (RDT&E) funding coupled with meaningful export control reform are key to improving this situation.

LTC Eric Anderson, US Army  
COL David Applegate, US Army  
Lt Col Anthony Babcock, US Air Force  
Lt Col Peter Bonetti, US Air Force  
CDR Lance Dettmann, US Navy  
Mr. Timothy Donnelly, Department of the Navy  
COL Timothy Greenhaw, US Army  
LTC Glen Heape, US Army  
Mr. Raju Karira, US Secret Service  
COL Joe Martin, US Army  
Ms. Mai-Thao Nguyen, Department of State  
Mr. Michael Quinn, Defense Intelligence Agency  
Dr. Mark Stanley, National Security Agency  
LTC Allison Stewart, US Army  
LtCol Jeffrey Stower, US Marine Corps

Dr. Shannon Brown, Lead Faculty  
CAPT(Ret) Frank Pagano, US Navy, Faculty  
COL Quenton Rashid, US Army, Faculty  
LTC John Barber, US Army, Faculty



## PLACES VISITED

### **Domestic:**

Trijicon; Fredericksburg, VA  
Beretta USA; Accokeek, MD  
US Marine Corps Systems Command (Acquisition); Quantico, VA  
Shooting, Hunting and Outdoor Trade Show; Las Vegas, NV  
Allegany Ballistic Laboratory; Rocket Center, WV  
Radford Army Ammunition Plant; Radford, VA  
Smith & Wesson; Springfield, MA  
FLIR; North Billerica, MA  
Raytheon Missile Systems; Tucson, AZ  
US Border Patrol Nogales Station; Nogales, AZ  
309<sup>th</sup> Aerospace Maintenance and Regeneration Group; Davis-Monthan AFB, AZ  
Nammo-Talley Mesa; Mesa, AZ  
Dillon Aero; Scottsdale, AZ  
Taser International; Scottsdale, AZ  
Sturm, Ruger & Company, Incorporated; Prescott, AZ  
ATK Armaments Systems; Mesa, AZ  
The Boeing Company; Mesa, AZ  
National Testing Service, Inc.; Camden, AR  
Highland Industrial Park; Camden, AR  
Aerojet-RocketDyne; Camden, AR  
Spectra Technologies, LLC; Camden, AR  
Barrett Firearms; Murfreesboro, TN

### **International:**

Bulgarian Ministry of Defense; Sofia, Bulgaria  
Terem Letets SHC; Sofia, Bulgaria  
Kintex SHC; Sofia, Bulgaria  
Optix; Panagyurishte, Bulgaria  
Opticoelectron; Panagyurishte, Bulgaria  
Arsenal; Kazanlak, Bulgaria  
Maxam (Expal); Gabrovo, Bulgaria  
Arcus Company; Lyaskovets, Bulgaria  
Vazovski Mashinostroitelni Zavodi (VMZ); Sopot, Bulgaria  
National Defense University; Sofia, Bulgaria  
Institute of Metal Science, Equipment and Technologies; Sofia, Bulgaria  
Bulgarian Defense Industry Association; Sofia, Bulgaria



## INTRODUCTION

A strong domestic manufacturing base capable of providing the US armed forces with technological superiority over any competitor has underpinned US military strategy since World War II. However, since the 1990s, the US defense industrial base has continued to shrink through a mixture of mergers, failed business strategies, and government inattention to industry dynamics, specifically lower-tier suppliers. Faced with the possibility of a 10-year period of enforced defense austerity, it is important to understand the status of the weapons industrial base as it exists today, and the potential impacts over the next decade. Although the US weapons industry remains fairly diverse, it will continue to be important to monitor this aspect of US domestic capabilities in order to ensure future strategic capabilities.

**Small Arms.** The small arms sector in the US is robust, fueled primarily by a healthy civilian consumer market that is often hotly contested, but remains for the most part loosely regulated. The last several years have seen a significant growth in private arms sales, largely in response to attempts by activist groups and various government entities to restrict or ban certain types of firearms. In discussions with representatives of industry associations as well as independent firms, firearms sales are expected to decrease from the 2013 high point, but remain strong into the coming years.

**Munitions.** The munitions sector remains robust but with much less competition than was observed within the weapons industry. In the area of consumer-grade munitions, the US civilian market again dominates the business space. The rise in firearms sales has been accompanied by a commensurate rise in ammunition sales, actually leading to scarcity in some variants, and significant increases in price. The US government continues to purchase significant quantities of munitions ranging from small caliber pistol bullets through advanced long-range aircraft missiles. Department of Defense (DoD) purchases munitions from other countries, largely Warsaw Pact-standard munitions provided to allies such as Afghanistan and Iraq.

**Sensors.** Sensor development and production is one sector of the weapons industry where innovation continues. Advances in utilizing all facets of the electromagnetic spectrum, to include (but not limited to) visible light, infrared, and radar are coupled with developments in size, weight, and power performance (SWaP) of batteries. This allows integration of multiple sensors and additional computing power sufficient for on-board ballistic calculations in a riflescope.

The Weapons Industry Seminar had the opportunity to conduct field visits throughout Bulgaria, which maintains significant capabilities to produce small arms and munitions. Contrasting the business practices, competitive environments, and strategic perspective of US and Bulgarian firms gave the students additional insight as to the overall health of the weapons industry.



## **KEY ASSUMPTIONS AND DEFINITIONS**

This report makes several key assumptions, as follows:

- The US will continue to place a high priority on technological superiority.
- Defense budgets will remain constricted at or near the levels determined in the Budget Control Act of 2011, and this will force further prioritization between research and development, acquisition of complex weapons systems, modernization of existing weapons systems, and continued service of existing force structure and its associated equipment.
- The strategy of a rebalance towards Asia, aggressive behavior by Russia, the rise of ISIS, a desire to maintain US influence, and access to the military capabilities of allies will necessitate continued US support for arms exports through Direct Commercial Sales, Foreign Military Sales, and Foreign Military Financing.

Key Definitions include the following:

- “The Department” should be understood to refer to the Department of Defense (DoD) unless otherwise specifically stated.

## **THE INDUSTRY DEFINED**

The weapons industry encompasses many sectors and markets. Globally, private firms, state-owned companies, military organizations, and government-operated facilities participate in the design, testing, and manufacture of weapons for both civil and military use. The majority of weapons are produced for use by military and law enforcement, with the United States representing the largest civilian market for small arms. Advanced munitions are exclusively marketed for use by governments, while energetics and propellants are often dual-use materials, serving both military and civil applications. The sectors of the weapons industry to be discussed in this report include:

- **Small Arms.** For the purposes of this study, small arms includes handguns, rifles, shotguns, less-lethal weapons, under-barrel and stand-alone grenade launchers, and crew-served weapons such as machine guns and mortars.
- **Munitions.** Includes ballistic projectiles used in weapons ranging from small arms to mortars.
- **Advanced Munitions.** Includes precision-guided bombs, missiles, and the rail gun.
- **Energetics and Propellants.** Includes gunpowder (all types), solid rocket propellants, and explosives, including (but not limited to) TNT, RDX, HMX, PETN, nitrocellulose, and their derivatives.
- **Sensors.** Includes any device used to improve the targeting of a weapon, in any range of the electromagnetic spectrum. Includes but is not limited to optical sights, thermal sights, night-vision enhancing devices, radars, and sonars. Advances in integrated sensor outputs, onboard ballistics calculations, networking between weapons, and speed of target acquisition are ongoing trends in this sector.



## Small Arms

### **Current Condition of the Market**

The seminar was impressed with the size, specialization within, diversity, and health of the US small arms industry. The seminar observed small arms manufacturing operations conducted by both public and private companies that are indicative of the industry writ large. Detailed briefings from senior leadership and tours of facilities in operation at several companies confirmed the perception that demand and production requirements remain steady, with some excess capacity available. Attendance at the Shooting, Hunting and Outdoor Trade Show (the largest domestic industry tradeshow) confirmed the size and diversity of the commercial industry on which the government relies for its small arms production. Companies that relied solely on military sales were most vulnerable to the down turn in defense spending. The market remains robust due to the preponderance of companies relying on an intentionally diversified strategic customer base that includes civilian, military, law enforcement and foreign sales. Overall, the seminar assesses that the small arms market is healthy domestically and can provide the required small arms to support any necessary surge capacity for the Department.

### **Market Outlook**

The US market for small arms remains stable and healthy due to sustained commercial and law enforcement sales, as well as some foreign exports. Increased sales of personal firearms have slowed recently from previous spikes resulting from both perceived and real gun control efforts by state and federal governments. Most companies anticipated a steady demand, but were prepared for a slow decline in response to normal market fluctuations over prolonged periods – market saturation has met demand for traditional products – spurring companies to develop innovative new “must-have” products that generate significant sales. At the same time, changing social dynamics and an uncertain political environment have benefited manufacturers.<sup>1</sup>

Contrasting the domestic market with experiences from our international travel, small arms manufacturers in Bulgaria provided insights reinforcing recurring themes throughout the course of our analysis. Privately-held companies in Bulgaria were significantly more advanced than their government-owned counterparts; produced and sold significantly more weapons; more aggressively pursued customers; and sought significantly more impressive and technologically advanced engineering and production capabilities. A number of the commercial companies appeared capable of rivaling their US counterparts in small arms production quality and quantity. Finally, the preponderance of Bulgarian sales were focused more on exports than civilian commercial sales, with only a miniscule portion of all sales going to the domestic (Bulgarian) military customer.

### **Challenges Facing the Market**

Our interactions with firms and industry associations indicated that no significant challenges threaten the industry. However, several firms we met with discussed the difficulty in competing for government contracts. Strategies to overcome the shortfalls of the system varied by company, but the recurring themes were the following:



- **Decision to not compete for DoD sales.** Companies embracing this strategy assessed the costs associated with meeting the Department’s requirements and deliberately decided that the potential benefits did not meet the company’s standard for return on investment. One company was reluctant to compete a weapon in the pending Modular Handgun System (MHS) competition for the Army’s next pistol. They stated that even if they won the competition, the sales to the Department would represent only 2% of their total domestic revenue, and it would provide a smaller return per weapon than they are currently gaining from commercial sales. MHS warrants further exploration as the case study illustrates the areas where the Army was, in some cases, too specific about requirements, and other areas where the Army was too ambiguous about product requirements and expectations to provide industry a realistic understanding of their expectations. Industry’s negative experience with the Army’s recent Individual Carbine competition further tainted its view on DoD sales.
- **Develop commercially viable products.** These companies expressed the hope that the Department would recognize and purchase their products as COTS (“commercial off-the-shelf”) items – either through USSOCOM or an individual Service. Regardless of larger DoD sales, the products would be self-sustaining in the commercial market. DoD sales were seen as a win but unnecessary for corporate viability.
- **Focus the company (almost) exclusively on Defense sales.** Invest significantly to win defense contracts. These companies viewed the Department as high-risk, high-win opportunities. Companies with these strategies either had other product sales to sustain financial viability in lieu of the risk or were willing to “bet the company” to win Department sales.

## Policy Recommendations

The seminar recommends the Department provide better oversight and review of requests for proposal (RFPs). Lack of clarity or impractical demands produces uncertainty for companies and engineers in their ability to understand and meet requirements. Analysis of the volume of clarification requests from industry in response to an RFP provides insight into the quality of the request. Ambiguous and illogical RFPs discourage companies with strong commercial sales from competing in a long, confusing process for little gain. However, it is these companies who usually have proven success in research and development and competitive commercial products that can likely provide the best product for the military.

At the same time, some structured vagueness in RFPs can drive companies to innovate. Some firms indicated that the modular handgun system (MHS) contract spurred them to innovate but primarily to improve their commercial products; the costs of competing for the MHS contract was not worth the relatively small profit. The Department can encourage these companies to innovate and subsequently compete if the acquisition process is less cumbersome and confusing. Acquisition personnel must have a firm understanding of what is available in the commercial market and recent innovations to shape proposals. In order to encourage the best companies to compete for small arms contracts, the Department will need to ensure requirements remain economically feasible – with low barriers to entry. Striking an appropriate balance is the challenge.





## Energetics

### **Current Condition of the Market**

The seminar observed energetics production operations conducted by commercial firms at both Allegheny Ballistics Laboratory and Radford Army Ammunition Plant. Discussions at both sites informed the perception that production requirements remain steady, although there is some excess capacity available. The most complex energetics produced at these sites are used in rocket and missile motors produced at other facilities. Another aspect of the energetics segment are the multiple small arms ammunition manufacturers that exist domestically, and although the seminar did not visit any domestic production sites, research indicates that the commercial and military markets for small arms ammunition is robust.

### **Market Outlook**

The US market for energetics remains stable and healthy due to continued US military engagements and exercises across the globe, a continued emphasis on force readiness, and the ability to utilize many of the products for commercial civilian uses such as mining, pyrotechnics, and, among other products, automotive airbag actuators. The surge in personal firearms sales in the US has been accompanied by a robust increase in ammunition purchases, spurred in some degree by reported governmental attempts to ban certain types of popular ammunition, as well as the ongoing debate regarding Second Amendment rights.

Our site visits to Bulgaria yielded another perspective on this market. Bulgaria's domestic demilitarization operation demonstrates a strong business case for disposing of obsolete or otherwise unwanted munitions and recycling the energetic material into civilian ammunition, TNT, and other explosives-related products for resale. This indicates that current production of new energetics does not meet worldwide demand, enabling the development of a successful recycling/reutilization market to meet demand.

### **Challenges Facing the Market**

Several challenges face the energetics market. First, many production facilities critical to the energetics supply chain are government-owned plants that date back to World War II, and these plants have an ongoing need for infrastructure modernization. This is especially alarming due to the limited domestic capabilities the US has in this segment of the industry. For instance, Radford is the only domestic producer of nitrocellulose, a key ingredient in many US armaments. A secondary effect of this limited scale production within the US means that the demand on second and third tier suppliers for many of the specialty chemicals is low and, on occasion, these chemicals cease being economically feasible to produce. This forces reformulation, testing, and recertification in order to incorporate new chemicals into established defense products so as to continue to meet requirements. There is additional risk due to the specialized nature of some of the precursor materials, such as the pulp used in nitrocellulose manufacturing. Radford relies on a specific species of tree that is provided by an extremely narrow supply chain with little competition. Trouble with the procurement of this seemingly simple material could cause major perturbations throughout the industry.





Another major challenge to this portion of the weapons industry is environmental compliance. Government owned facilities are a major part of the landscape due to state and federal Environmental Protection Agency regulations governing the industrial processes involved. These sites allow some measure of relief for contractors who operate the facilities and allow them to produce at a cost that is acceptable to the government while complying with existing regulations.

Addressing environmental regulations for firms in the industry that are producing key products for the defense base may be a prudent measure to investigate further. There is the possibility that additional capacity and competition could be achieved if environmental requirements were relaxed in favor of products specially designated as strategically important to defense.

## **Policy Recommendations**

We recommend the Department evaluate the energetics supply chains for all weapons systems and identify chokepoints and single points of failure. Government should evaluate infrastructure to determine where necessary improvements should be made, and where risk assessments support such activity, it should provide funding to reduce or eliminate the recognized issues.

If funding cannot be made available to secure this manufacturing capability, the government should consider transitioning the facilities to privately-owned, contractor-operated activities. In order to make this economically feasible, the government may need to consider tax incentives and environmental waivers, remaining in effect for as long as the required manufacturing capability is maintained. Such a transition would be executed with the goal of enabling a business case sufficient to incentivize required production along with modernization of existing facilities.

## **Sensors**

The seminar interacted with a number of companies focused on producing sensors for a wide range of weapon and surveillance systems. The generic term “sensor” is used to describe a vast array of equipment used to detect or target an object in the fields of Intelligence, Surveillance, and Reconnaissance (ISR); target acquisition such as on a precision guided munition (PGM); or an optic on a small to medium caliber weapon. The sensors observed were designed for firearms, autonomous ISR vehicles, manned ISR vehicles, and PGMs. The markets for these three basic groups are extremely different but firms are increasingly synthesizing technologies for use across the spectrum of products.

Key observations include the following:

- The optics industry is strong and getting stronger due to increased competition and improvements in size, weight, and power performance (SWaP) of batteries and increased demand. In the last year, more firms have joined the market for firearms optics. Increasing demand seems to be the main driver for new entrants into this market. Some of these companies were completely new entrants or branching out from other types of optics such



as telescopes and binoculars. Innovation was evident from enhanced dual-view optics to high-tech scopes integrated with the individual weapon trigger mechanism to fire only once the target is acquired.

- The US market for firearms and the challenge of selling internationally because of International Traffic in Arms Regulations (ITAR) restrictions makes traditional military optics suppliers focus less on the military market and concentrate on the domestic market.
- For ISR optics, a few companies continue to dominate the thermal core processor market - an extremely critical component of cooled optics.<sup>2</sup> A number of optics manufacturers rely on other optics companies for thermal core processors to produce their end product. A common theme among optics companies is to take advantage of other companies' markets by producing components and jointly working together, as opposed to purely competing for the market share. The government benefit to increased sales of thermal core processors is that it is driving the price down and making higher-end optics cheaper over the long term.
- Optics companies are not responding to advances in multispectral camouflage, even though camouflage companies openly advertise their products' capability to defeat advanced sensors. As operators become more reliant on ISR and targeting sensors they will have increased challenges finding the adversary that is exploiting the burgeoning multispectral camouflage market.
- PGM sensor improvement exists but is relatively stagnant and is arguably not keeping up with the likely warfighting environment. This is primarily due to a focus on current production as opposed to responding to a future threat.<sup>3</sup>

## **Policy Recommendations**

The sensor sector is healthy and driving much of the innovation in the industry. Improved government requirements, better threat data, and more robust sharing of the likely warfighting environment will likely lead to improvements in ISR sensor capability, medium caliber optics, and PGM sensor design.

## **CHALLENGES FACING THE WEAPONS INDUSTRY**

The US and Bulgarian arms industries face some of the same challenges in today's global environment, yet their perspectives are dissimilar. The US arms industry can rely on US government regulations that require primarily US manufactured products for their defense procurements, which provides a degree of insulation from competition with international companies that do not have domestically-sited production capabilities. Even with a decline in the overall US defense budget, the arms industry in the US can continue to rely on a larger percentage of US gross domestic product (GDP)—around 3.8% spent on defense—compared to Bulgaria, with less than 1.8% spent on defense. Incidentally, there is a significant difference in GDP between the two countries, with \$6.8T in the US compared to \$54B in Bulgaria for 2014.

Additionally, the US arms industry relies more on US customers, both defense and commercial, than on international customers. However, there are efforts by most US companies to increase their international sales as a way to stimulate growth. Bulgarian arms companies, on the other hand, are primarily exporters. In fact, 90% of their defense industrial base products are exported. External sales of defense-related products and services are the only avenues for their



arms industry to survive, as the Bulgarian military-industrial complex can no longer rely on state largess to endure. In 1989, there was a significant restructuring of the Bulgarian military-industrial complex that created over 134 companies, yet they remained state-owned. This created huge problems for both the government and the industry in Bulgaria as production declined, innovation ceased, and capital investments to modernize and upgrade facilities dried up. By the late 1990's, the Bulgarian government decided to privatize the bulk of its defense industry. Now the original 134 companies are down to approximately 30, with only 2 remaining as state-owned for "strategic" reasons. The now-private companies have turned to external markets for revenues as the Bulgarian government significantly cut all defense expenditures.

One of the primary external sources of revenue for Bulgarian armaments and defense services is the US government. This poses a challenge for both Bulgarian and US arms companies. For US companies, there is increased competition for US government contracts as the Department of Defense (DoD) budget is in decline and overseas contingency operations (OCO) funding is being significantly reduced as operations in Afghanistan draw down. For Bulgaria, the situation seems even more dire for the long-term. Currently, many Bulgarian military industrial-based companies obtain at least 25% of their revenues from US government contracts. One company, Vazovski Mashinostroitelni Zavodi (VMZ), who claims to be the "biggest enterprise of the military-industrial complex in Bulgaria," may receive upward of 40% of its revenues from US government contracts--mostly in support of arming US allies in contingency operations. As funding declines for these operations, both countries' military industrial base will have to find ways to compensate for the loss--or cease to exist.

In terms of employment, US manufacturers are mixed between a union and non-union workforce, while in Bulgaria, all of their laborers are unionized. The US arms manufacturers' wages are comparable to other domestic manufacturing industries in order to maintain a workforce with the required skill sets, but they have infused technology, such as computer numerical control (CNC) machines, to reduce the need for some labor. Conversely, while Bulgarian arms manufacturers use CNC machines for portions of their manufacturing process, they employ a skilled workforce that is low paid and, thus, fully automated lines are not deemed necessary. This labor-intensive production construct also serves to maintain employment levels in the country, and likely aids in gaining local and governmental support for these firms. The seminar was unable to determine how powerful union forces are in Bulgaria and what role they may play in preventing further automation of these production facilities. However, numerous firms commented that they maintained excellent relations with their unionized workers, and this did not seem to be a significant issue to the executives who the seminar interviewed.

Bulgaria primarily competes in producing Warsaw Pact standard munitions, but several companies have begun to compete with US firms in manufacturing munitions that meet NATO standards. While still producing to Warsaw Pact standards allows them to remain competitive in that market, they have and continue to make some capital investments to meet the NATO requirements. However, it is proving expensive to enter direct competition with well-established NATO standard companies in the sales of arms and ammunition. To adjust to this, Bulgarian arms companies have sought to partner with or sell components to other companies, much like they have done with US companies. An example includes Arcus Co., a Bulgarian ammunition and small arms manufacturer, which has partnered with General Dynamics, ATK, and Nammo Talley, Inc. Another example is Opticoelectron, a Bulgarian optics company, which sells optical parts to General Dynamics. Building to the two different standards provides both opportunities and risks to Bulgarian arms companies that are not present in the US arms industry.



From a different perspective, the US government relies on Bulgaria's ability to meet the Warsaw Pact standards. In order for the US to provide arms to countries familiar with Warsaw Pact equipment, it must seek non-domestic manufacturers. The US military industrial base produces only NATO standard arms and ammunitions. Although US industry could produce US-manufactured, Warsaw Pact standard arms and ammunition for delivery to those countries, the switching costs from NATO to Warsaw Pact standards would be cost-prohibitive. Considerations driving a "buy" rather than "make" decision in this regard include additional training costs, weapons rearmament costs, individual soldier kit modification costs, and full maintenance supply package costs, just to name a few. Therefore, the US will continue to rely on countries like Bulgaria to maintain their Warsaw Pact standard production, even as Bulgaria moves to NATO standards.

## **GOVERNMENT GOALS & ROLE**

An active government role in regulating and supporting the weapons industry is necessary to maintain national security policies. Such government policies must recognize the current conditions of the US weapons industry, ameliorate challenges to the industry and adapt to emerging technology.

The US government must closely regulate and be actively involved in the weapons industry to ensure national security. The importance of weapons to warfighting and their inherent destructiveness justify maintaining a healthy yet *well-regulated* weapons industry.<sup>4</sup> As we have seen, not all sectors present the same need for government scrutiny and protection. The small arms sector has a robust civilian and law enforcement market that ensures companies will innovate, and it maintains adequate manufacturing in case of a surge. Such is not the same with the energetics and optics sectors. The former requires extensive government involvement because environmental regulations would make domestic production otherwise cost-prohibitive. The latter's focus on technological innovation demands that government monitor the transfer of this technology and steer the sector to produce products that meet DoD requirements.

Policymakers should strive to ease the administrative burdens of government regulations<sup>5</sup> but must severely limit the production and transfer of weapons when contrary to US foreign policy<sup>6</sup> and national security. In some instances, government also must actively support vital weapons sectors<sup>7</sup> for the warfighting effort. The challenge for policymakers is to ensure the long-term health of the weapons industry and closely control where those weapons are used, despite pressure for corporations to emphasize short-term profit over long-term concerns.

Innovation in the arms industry leads to, and is affected by, globalization, with both positive and negative effects to US companies.<sup>8</sup> US companies struggle to be competitive internationally, as other countries "have built their own [state-owned] weapons-manufacturing industries in order to create high-paying jobs, generate profits, and address domestic security concerns."<sup>9</sup> As our essay below on import-export restrictions detail, federal laws can have positive and negative effects on certain industries, sectors, markets, companies, and customers, creating "winners and losers." The challenge is for government to maximize the positive effects for national security while minimizing the negative effects to all others.

Critics of the US weapons industry stress that government regulations are not at fault for arguably lower profits but rather the "technology outsourcing and offshoring business models that are fueling today's business profits"<sup>10</sup> as a result of globalization have depressed profits for all players. In order to mitigate the harmful effects of the globalized arms industry, "governments can respond effectively through a variety of industrial policies and regulatory changes."<sup>11</sup> One



example of this is contained in our essay discussing acquisition reform below. Long criticized for its cumbersome procedures, we recommend a more comprehensive cultural shift by changing the way acquisition professionals are incentivized. In essence, the US government needs to be an active participant in the US weapons industry to ensure its good health.

US policymakers must constantly assess the effectiveness of current policies and propose new incentives for the industry to adapt to shifts in the global economic and security environments. As our essay below on precision guided munitions (PGM) argues, government must provide threat assessments to industry early in the acquisition process to influence the design of these systems. Such a collaborative relationship throughout the process will provide government with exactly what it wants while eliminating industry misperceptions of warfighting needs.

Government must eliminate administrative burdens to selling weapons overseas, more effectively communicate requirements, and provide timely threat assessments to guide industry to better meet those requirements. If implemented, these policy recommendations will meet government's responsibility to regulate and assist the US weapons industry to achieve national security goals.

The role of government is to provide an environment that ensures the weapons industry will continue to meet national security needs. In doing so, government must look at the long-term health of the private industry, not just immediate needs. Government should allow and encourage industry to sell commercially to lower the costs of developing and producing weapons to the taxpayers. Instead of developing requirements that meet only military specifications, government should develop military capability with commercial uses, where possible.

The federal government needs to encourage the weapons industry to implement responsible corporate practices that support the long-term viability of the industrial base, rather than short-term shareholder value. Competition that encourages innovation should be built into each government acquisition plan.

As the sole superpower, the United States should continue to control the production and transfer of weapons in support of US foreign, military, economic, and humanitarian policies. This can be done with minimal administrative burdens to the industry. While government has a responsibility to control the weapons industry, it also has the responsibility to maintain the industry for the public good. The central concern for policymakers is to exercise both these responsibilities as new weapons technology and new enemies appear. Keeping US technology from our enemies while supporting our industrial base will become more difficult as 3-D printing technology presents conflicts between national security and free speech rights.

## **ESSAYS ON MAJOR ISSUES**

### **Essay 1. Government-Industry Collaboration for PGM Capability**

Technological advancements and innovation in the Precision Guided Munitions (PGM) and optics industry can be stagnant during peacetime or when preparing for a distant future threat. In-depth interviews with a variety of US and foreign industry and defense officials reveal that continued and enhanced collaboration between government and industry is necessary to maintain steady advances in capability.<sup>12</sup> The necessity of DoD sharing of threat data earlier in the development process in order to better refine weapon system capabilities is a commonly recurring theme. There are also inaccurate perceptions of the likely future war fighting environment persistent throughout both industry and government. Providing more detailed threat





data to industry earlier in the acquisition and innovation process, while simultaneously discussing threat tactics, techniques, procedures, and technical capabilities, is critical to enhanced weapons development. The current process of providing system threat assessment reports is not influencing the design process the way it should, according to a 2014 defense acquisition journal written by government defense acquisition personnel.<sup>13</sup> This problem inhibits innovation, wastes government and industry resources, and results in weapon systems not as prepared for the war fighting environment as they could be.

There are a number of examples of innovative weapons tests over the last year. For example, the F/A-18 guided launch of a Tomahawk cruise missile from ship to ship. However, in some cases the question remains – is that innovation the right innovation to defeat the next adversary? Many companies are generally aware of the adversarial offensive capability and the nature of the war fighting environment. Unfortunately, many sensor and Precision Guided Munitions (PGM) manufacturers are unaware of the nature of the advances in enemy defensive capabilities that could directly threaten the performance of PGMs or the US ability to hold the adversary at risk. For example, most optics firms, interviewed for the purpose of this study, were only vaguely familiar with the multispectral camouflage industry which prides itself on defeating the latest optical capabilities. There is also an expanding market of GPS jamming, high quality physical mobile decoys, false-signal emitters or electronic decoys, and camouflage designed to defeat sensors that use the visual and non-visual spectrum. China, Iran, Russia, and North Korea appear to be investing resources into these technologies specifically designed to defeat PGMs and modern sensors.<sup>14,15,16,17,18,19</sup> As missile-producing companies attempt to innovate, it behooves them to understand the evolving nature of the war fighting environment. Although it is sometimes difficult to predict, the government needs to ensure it is sharing and passing as much threat data as possible to trusted vendors. It is important to pass this data through rapid and frequent collaboration in order to ensure timely and cost effective integration into designs. In concept, this is similar to recent US government efforts to share data on cyber penetrations and threat data with industry to protect US industry intellectual property. Improvements in these areas will likely enhance industry innovation and better prepare the United States with the eventuality of war against a more modern adversary.

### **Are Threat Assessments Effectively Influencing Industry?**

In the March 2014 issue of *Defense Acquisition, Technology, and Logistics*, a group of authors from the Defense Intelligence Agency (DIA) identified a number of problems in providing threat data to industry and government program offices. In conversation, a number of industry partners and government officials shared similar sentiments. The article states that, “Current System Threat Assessment Reports (STARs) are not produced in time to influence design decisions. STARs offer inconsistent decisional value, and are not tailored to support key activities in the acquisition process.”<sup>20</sup> In some cases, this is because of internal production processes, but a significant factor is also the formality of the threat sharing process and its timeliness. STARs are part of a formalized process but should not inhibit the sharing of informal threat and evolving war fighting concepts that can prompt innovation, which will result in weapon systems more tailored to the war fighting environment. The article recommends “a centrally managed DoD library of technology topic assessments that would provide customers with an identifiable, current, and authoritative source for each topic relevant to acquisition programs.”<sup>21</sup> This is an excellent concept that should be implemented, but, considering efforts to globalize parts of the defense industry, the process requires additional methods to share data



based on academic research and think tank data. While it's extremely important for the government to define requirements for industry, it is equally important that the government not restrict industrial innovation by withholding threat assessments that could fuel new concepts, weapons, sensors, etc.

### **Decoys During Kosovo and Gulf War Expands Interest in Deceptive Materials:**

The public acknowledgment of the success of deceptive technologies during Operations DESERT STORM and ALLIED FORCE have further encouraged the development of the signature management industry. Time Magazine declared the "US military's inability to defeat the Scuds turned out to be its biggest failure in the war."<sup>22</sup> The Gulf War Air Power Survey states that planners incorrectly assumed decoys would not affect the targeting process and planners found that Scud missiles were "surprisingly elusive".<sup>23</sup> It is important to understand that targeting the Scuds was a critical operation, which involved significant F-15E assets designated for the mission in Day 1 of the Air Tasking Order.<sup>24</sup> Iraq was also firing Scuds into Israel, which threatened an Israeli counterattack, and a disruption of the Arab and Western Coalition. Iraq successfully launched approximately 88 Scuds at Israel, Saudi Arabia, and Bahrain during the war. Over the 43 days of Operation DESERT STORM, approximately 1500 strikes were conducted against Scud targets, not including ground missions by Special Forces.<sup>25</sup>

However, no actual Scud launchers were successfully targeted. In fact, UN observers later reported what was in fact targeted were both low and high fidelity decoys. During the 1999 Operation ALLIED FORCE, NATO publicly claimed it had destroyed more than 200 tanks and had isolated Serbian military units from their supply bases. However, media coverage of the Serbian military withdraw from Kosovo revealed convoys of tanks, armored cars, artillery, trucks, and other military equipment previously thought destroyed. The Commander of the Serbian army, General Nebojsa Pavkovic, reported to BBC, "We used other measures, too: camouflage, decoys, and it was mainly these that NATO aircraft destroyed."<sup>26</sup> The fact that decoy and camouflage operations in Iraq and Serbia significantly changed the scope of the war plan is fairly well publicized.<sup>27 28</sup>

Although decoys and camouflage are not a new technical innovation, the technical capability of physical and electronic decoys as well as multispectral camouflage is evolving at a rapid rate and perhaps exceeding the rate of weapon sensor developments. In Iran, published works by the Command and Staff College of the Islamic Revolutionary Guard Corps highlight the success of deception during Allied Bombing Campaigns.<sup>29</sup> Analysis published in the Australian Air Power journal asserts that new equipment of Russian and Chinese origin is in direct response to these emerging capabilities.<sup>30</sup>

The website Alibaba, Chinese equivalent to Ebay, openly features military decoys from companies in China. Those decoys range from cheap, low end models to decoys that cost in the tens of thousands of US dollars.<sup>31</sup> An excerpt from the 2014 Annual DoD Report to Congress on the Chinese military provides some insight of Chinese military perceptions of deceptive material and practices:

"In historical and contemporary PLA [People's Liberation Army] texts, Chinese military theorists routinely emphasize the importance of secrecy and deception... In 2012, and 2013, the Chinese press featured the PLA using a variety of denial and deception methods, including camouflage, decoys, and satellite avoidance activities during training events to protect PRC [People's Republic of China] forces from enemy surveillance and





targeting... Contemporary PLA writings also indicate the Chinese view D&D as a critical enabler of psychological shock and force multiplication effects during a surprise attack, allowing the PLA to offset the advantages of a technologically superior enemy.”<sup>32</sup>

One of the key deception principles in official PLA monographs is “conforming to what the enemy expects and creating false images that correspond to the target’s psychological tendencies and expectations.”<sup>33</sup>

### **Recommendations and Conclusion:**

Peacetime innovation in military industries can be hard to achieve, although financial profit is a significant motivator for innovation and should not be discounted. Desperate times make for desperate measures - which have historically created significant innovation during wartime. Given the propensity for surprise in war, should we expect the weapons industry to evolve to meet the threat, or only respond to the given requirements? Shouldn’t the weapons industry be as keenly aware of the concept of operations as the intelligence analyst, the military planner, and the warfighter? The most significant conclusion is to enhance government and industry collaboration at the classified and unclassified level to understand the nature of the war fighting environment to include the likely threats. Modeling the recent US government efforts to share cyber threat data with non-defense industry companies is a good example.

### **Essay 2. Import / Export Restrictions:**

#### **To Provide for the Common Defense**

The United States controls the weapons industry with sticks and carrots. As the industry’s best customer, the federal government also provides market incentives to guide the actions of the weapons industry. Various federal statutes control almost every aspect of the development, production, and sale of weapons. The US restricts the transfer of items and technology (including training) that is “specifically designed, developed, or configured, adapted, or modified for a military application” that have no “predominant civilian application”<sup>34</sup> or have dual civilian-military use through the Export Administration Act (EAA), the Arms Export Control Act (AECA), the International Emergency Economic Powers Act (IEEPA), and through its enforcement of international (e.g., United Nations) sanctions.<sup>35</sup>

These laws allow the federal government to “nationalize” essential industries in times of war and restrict the import and export of weapons and weapons technology that “would make a significant contribution to the military potential of any other country or combination of countries which would prove detrimental to the national security of the United States.”<sup>36</sup> The federal government also regulates the weapons industry by determining who may have access to classified materials<sup>37</sup> or the corporate citizenship of companies engaged in the industry through the Committee on Foreign Investment in the United States (CFIUS).

The federal government, through the Department of Defense, recognizes its duty to maintain weapons technological superiority to meet our national security needs.<sup>38</sup> The Quadrennial Defense Review (QDR) recognizes that “highly advanced weapons systems – previously available only to those with significant research and development capabilities and large acquisition budgets – could proliferate and change warfighting equations.”<sup>39</sup> The nature of



today's technology allows weaker states and non-state actors access to deadly weapons quickly and cheaply.<sup>40</sup> Though some may argue that technology is not as important as other national powers,<sup>41</sup> it remains an essential tool in the national security toolbox. The US must not give up the ability to strictly control those who will have access to sophisticated US weapons merely to increase profits for one section of the US economy, risking the security of all else.

### **To implement US foreign policies and address humanitarian concerns**

The United States also uses arms exports and imports to “induce or compel foreign governments to embrace American concepts of social morality.”<sup>42</sup> Sharing defense technology is an effective means of international diplomacy.<sup>43</sup> Trade, especially for an item that ensures a nation's security, leads to mutual interdependency and peace.<sup>44</sup> Use of import controls to assist foreign defense industrial bases also provide US leaders with influence over the economies (and therefore, key players) of those countries.<sup>45</sup>

Nevertheless, the ability to determine arms sales can be a double-edged sword. Weapons can prevent or end a conflict, but they often intensify conflicts with devastating humanitarian consequences.

[I]t is commonly recognized that small arms are not simply instruments of violence. Rather, small arms play a critical role in the initiation, escalation, duration, and resurgence of conflict and human rights violations in areas of tension.<sup>46</sup>

Exportation of arms is neither intrinsically good nor bad. As one commenter noted, “[t]he impacts of exported weapons depend on the forces driving the trade and the circumstances under which they are used,”<sup>47</sup> which calls for an assessment of the forces and determination of the circumstances under which they are used. Government has a duty to control who gets access to American weapons. This is not an easy task and government often gets it wrong; our one time allies sometimes become future enemies. The volatile, uncertain, complex and ambiguous geopolitical dynamic therefore makes an argument for more Government control of weapons, not less.

### **To maintain the strength of the US economy**

Both those who advocate “on behalf of the free market” and those who advocate government's role “to correct market failures” agree that the national goal is a “healthy, growing economy.”<sup>48</sup> Critics of weapon exports cite loss of overseas sales to foreign weapons manufacturers as proof that regulations hurt the US economy. However, the record profits of major US weapons companies contradict these claims.<sup>49</sup> Critics often fail to acknowledge foreign consumers' decisions to buy less expensive weapons for which US manufacturers are not as competitive, and focus only on US government restrictions.<sup>50</sup>

### **The Need for Reform**

In response to industry and the American people, “[i]n August 2009, the President directed a broad-based interagency review of the U.S. export control system, with the goal of strengthening national security and the competitiveness of key U.S. manufacturing and technology sectors by focusing on current threats, as well as adapting to the changing economic and technological landscape.”<sup>51</sup> This led to findings that reform was needed, so the President stood-up his Export Control Reform (ECR) Initiative. Phase I of this initiative was completed,



and it consolidated and standardized definitions used across the conventional arms control import/export spectrum as well as improved licensing processes. Phase II is underway, and is clarifying the various categories, with special emphasis on those categories that can be worked without enacting legislation.<sup>52</sup> In one area, satellites, the President worked with Congress to enact the needed change under the National Defense Authorization Act of 2012. Continued bi-partisan cooperation is needed to ensure that America's industrial base is provided a more equal opportunity to compete in the arms marketplace. "Phase III will require legislation to implement a government reorganization that would consolidate the current processes into a:

- Single Control List
- Single Licensing Agency
- Single Primary Enforcement Coordination Agency
- Single IT System."<sup>53</sup>

The results of the President's initiative will significantly improve the landscape for small businesses. According to the ECR Initiative Improvements for Small Business fact sheet:

The President's Export Control Reform Initiative is designed to facilitate secure trade by all U.S. exporters, particularly small businesses. Small firms account for 99.7 percent of all employers, comprise 98 percent of all identified exporters, and account for 33 percent of export value, yet the smallest firms (those with fewer than 20 employees) spend 36 percent more per employee than larger firms to comply with federal regulations. Small businesses are the engine of technological innovation. It is in U.S. national security interests to ensure that these small businesses can successfully navigate the nation's export control system.<sup>54</sup>

This is particularly critical to industries that have small margins, try to make up the difference by selling in large volumes, and are engaged in indefinite quantity-indefinite delivery contracts. The licensing burden alone is enough to make many of these firms give pause for determining whether or not to compete in the world market. The fact that each transaction, if not included within an existing license, requires a new license becomes a massive cost driver. For small businesses, this can lead to destitution under the weight of the regulated environment.

## **Conclusion**

To remain strong, the nation must serve both its constituency at home through economic improvement (e.g., strong industrial base) and its friends and allies abroad through interoperability and shared development. As the sole superpower, the United States should continue to control the production and transfer of weapons in support of US foreign, military, economic and humanitarian policies. This can be done with minimal administrative burdens to the industry. While Government has a responsibility to control the weapons industry, it also has the responsibility to maintain the industry for the public good. The central concern for policymakers is to exercise both of these responsibilities as new weapons technology and new enemies appear. This essay does not advocate for repeal of the AECA, IEEPA, and/or EAA nor to gut the resulting International Traffic in Arms Regulations (ITAR) and Export Administration Regulation (EAR) that support the legal implementations. It is to say that there are potentially portions of the statutes and the regulations that could be altered to promote industry at home and



enhance partnerships abroad. It just takes the political will to do so. The Presidents ECR Initiative is a start, but there may be further reform needed to level the playing field for a future global arms market where friends and partners are made by bringing them closer to the US through shared experiences.

### **Essay 3. Defense Acquisition Reform: Where Do We Go From Here?**

A common theme throughout our visits with industry, from small arms manufacturers to energetics and missile producers was desired reform of the Defense Acquisition System. While the companies refrained from expressing outright disdain with the process, there was an air of tension that alluded to the desire for better and more frequent communication, clear requirements, and adjustments to intellectual property requirements. This theme has also been front and center in both the Senate and House Armed Services Committees, with both pushing for a new round of reforms.<sup>55</sup> The thought that reform of the defense acquisition system, which attempts to manage and deliver the world's best technological capabilities, will ever be perfect or end is naïve. Ultimately, it is time to stop talking about continued acquisition reform and time to develop and implement legislative change to address both government and industry concerns.

#### **Discussion**

Since the end of the Eisenhower presidency, “more than 27 major studies of defense acquisition reform have been commissioned by presidents, Congress, secretaries of defense, government agencies, study and analysis organizations, and universities.”<sup>56</sup> If there has been one constant in defense acquisition, it is that most believe the system is broken and delivers “less, late, and at a higher cost than it should.”<sup>57</sup> However, there is also a growing group of scholars who think as Harvey Sapolsky does:

“No country, friend or foe, produces better weapons faster or cheaper than we do. The apparently eternal quest for acquisition reform is a hopeless—even foolish—search for a way to avoid the realities of our political system and the uncertainties inherent in seeking advanced weapon systems. It is always going to be a messy process burdened by frequent performance disappointments and the occasional cancelled project.”<sup>58</sup>

The last round of major acquisition reform occurred in 2009 with the Weapons System Acquisition Reform Act (WSARA). It targeted the areas of systems engineering, test and evaluation, cost estimating, and program assessments. In a 2014 hearing on the “Reform of the Defense Acquisition System,” Senator Levin discussed with the Government Accountability Office that WSARA has driven “higher levels of knowledge at key decision points and achieved reduced cost on a significant number of major defense acquisition programs.”<sup>59</sup> Nonetheless, improving the acquisition system is not a one-time event, it must be addressed continuously to adapt to the ever-changing operational and fiscal environments.

It is this model of continuous process improvement that the Undersecretary of Defense for Acquisition, Technology & Logistics (AT&L) has followed with the Better Buying Power initiatives (1.0, 2.0, Draft 3.0). These three initiatives are the Department of Defense's attempt to continually reform and adapt to the challenges of acquisition. Additionally, on January 7, 2015, AT&L released an updated Department of Defense Instruction 5000.02, “Operation of the



Defense Acquisition System,” which drives home the concept that acquisition requires “careful thinking... tailoring of program structures” and that the models provided should “serve as examples and starting points.”<sup>60</sup> There are no statutes, directives, instructions, processes, or policies that can solve the complex world of weapon system acquisition; it is only the acquisition workforce operating within the given framework who will be able to deliver capabilities.

House Armed Services Committee Chairman William “Mac” Thornberry unveiled the first of what appear to be many acquisition reform initiatives at the Center for Strategic and International Studies on March 23, 2015. Chairman Thornberry characterized the reform as a process that will be a six-year evolution. The first round of changes attempts to address the fundamentals in acquisition: people, acquisition strategies, chains of command, and reporting requirements. The overall theme is one of empowering the acquisition professionals with the necessary authority and accountability to develop acquisition strategies for needed capabilities. In an effort to streamline the acquisition, simplify the chain of command, and thin out and remove antiquated reporting requirements, Chairman Thornberry introduced small incremental changes within House Resolution (H.R.) 1597. There are many other areas to address, but it appears that Chairman Thornberry’s approach is one of crawl, walk, then run.

## **Issues and Challenges**

With the mandatory budget cuts implemented by the Budget Control Act of 2011 and the uncertainty of long-term budgets, significant concern continues to be raised by industry regarding the stability of requirements across the Future Years Defense Program (FYDP) due to downward budget pressure. One weapon system acquisition that was raised on multiple occasions was the US Army’s Individual Carbine (IC) procurement from 2010 through 2013. The objective of the IC acquisition was to replace the existing M4 carbines utilized by the Army; the other services chose to stay with current weapons in service. The IC acquisition was the second attempt to replace the M4 carbine, as a previous attempt in 2005 provided a sole source contract for the XM-8 to Heckler & Koch, but was later overturned for various reasons.<sup>61</sup> In 2013, the House Armed Services Committee and DoD began questioning the need for the IC acquisition with decreasing fiscal resources, while the Army continued with Phase 2 testing of the eight replacement prototypes.<sup>62</sup> The IC was cancelled in June 2013, with the Army citing failure of the proposed carbines meeting the specified scoring measures to proceed to the next round.<sup>63</sup> To make matters worse, the Army cited the carbines inability to perform well using the M855A1 ammunition; however, the original requirement and industry assumed use of M855 ammunition.<sup>64</sup> The IC program appeared to be on the path for cancellation with the looming budget cuts of sequestration, but the way in which the Army cancelled the program left a bad taste with industry.

In addition to the IC competition, the Army has also undertaken the Modular Handgun System (MHS) acquisition with the end objective of delivering “improvements in handgun performance in the areas of accuracy and dispersion out to 50 meters, terminal performance, modularity, reliability, and durability in all environments.”<sup>65</sup> Discussion with industry around the requirements has highlighted concerns surrounding what appear to be vague or inconsistent MHS requirements. From the open-caliber requirement alluding to a larger round while having the ergonomics necessary to support the ergonomic “requirements to the female 5<sup>th</sup> to male 95<sup>th</sup> percentile.”<sup>66</sup>





Additionally, the MHS requirement calls for “Commercial of the Shelf” (COTS) capability but is driving internal development by industry to meet the desired performance specifications. The concerns raised during industry visits revolve around the ownership of the intellectual property (IP) that goes into the design and manufacturing of the MHS. IP ownership and the trend in DoD acquisitions attempting to gain ownership of IP for the DoD is a troubling trend raised by every firm visited who had dealings with the DoD. Industry not only remembers, but also often cites the experience of Colt, with its M4 design and subsequent unauthorized release of M4 Technical Data Package to industry. If the MHS is a COTS product, but the DoD gains the IP, multiple commercial products of potential bidders could become open source. Numerous companies stated they have raised questions and concerns during the industry days, as well as in comments on draft requests for proposal; however, the concerns have not been completely addressed.

## **Recommendations**

Better communication is a pillar of both the Better Buying Power initiatives as well as a “Myth-busting Memo” released by the Office of Federal Procurement Policy on improving communications in acquisition, but more needs to be done. This is where incentives are key, and Chairman Thornberry addressed this in his comments at the Center for Strategic and International Studies (CSIS). It is time to revisit how the players in acquisition are incentivized to change a culture where fear of the appearance of ethical misconduct or potential for protest has driven a wedge between Program Managers and Industry. Both Congress and AT&L need to continue to increase communication with industry to ensure DoD moves forward with requirements that are clear, concise, and executable by industry. Adjusting a system requirement or performance specification due to input from industry about the feasibility of delivering to that requirement must be part of each acquisition effort.

A corporation’s IP is critical to their own success and the DoD needs to respect that domain if it desires to take advantage of knowledge and power the private sector can bring to bear in the defense market. The proposed H.R. 1597 contains a small portion regarding IP, directing the “Defense Business Board to conduct a review of...regulations and practices, and laws...related to Government access to and use of intellectual property rights of private sector firms.”<sup>67</sup> This is a step in the right direction for potential IP reforms in the first round of proposed changes to the acquisition system. Congress, DoD, and industry must work together to find the proper balance of technical data rights that protect the IP for industry-developed innovations but also gives the government the needed access for potential cost-saving efforts. Each year we fail to clarify the current IP regulations within legislation is another day that industry questions whether or not they want to enter the market with DoD. Additionally, the DoD should work with industry partners like the National Defense Industrial Association and the Professional Services Council to model IP reforms on already existing models like Small Business Innovative Research (SBIR) projects.<sup>68</sup>

## **Conclusion**

These failures to communicate between industry and the government, vague or competing requirements, and insufficient resolution of IP concerns are a common theme across DoD acquisitions. They have also been a constant theme through our industry study visits as



well as in testimony and point papers delivered to Congress. The key is what will Congress do with all of this data about how bad defense acquisition is, even though many argue the system works and just needs some tweaking. Chairman Thornberry referenced a quote by Thomas Friedman that states, “Pessimists are usually right...Optimists are usually wrong. But all the great change in history, positive change, was done by optimists.”<sup>69</sup> It appears there may be just enough optimists in the right places to develop and implement needed changes.

## CONCLUSIONS AND RECOMMENDATIONS

The US government is well supported by a stable, responsive, and capable weapons industrial base. Commercial firms use a mix of government- and private-owned facilities to manufacture the armaments necessary to achieve US strategic objectives. While US firms are currently competitive with their international counterparts, there are a number of policies and legislative actions that could be implemented in order to improve the position of US firms in the international market.

**Export Control Reform.** Meaningful export control reform can greatly assist US arms manufacturers by simplifying the requirements and process, as well as clarifying what products must be controlled. US firms should not be restricted from selling technologies already available on the international commercial markets. Both the government and the firms involved have a vested interest in appropriate, well-regulated export controls, but this system has spiraled into a process that lacks direction.

**Sustainment of Government-Owned Manufacturing Facilities.** Government-Owned, Government-Operated (GOGO) and Government-Owned, Contractor-Operated (GOCO) facilities require sustainment and modernization funding in order to protect critical and, in some cases, single sources of supply for the defense industrial base. The impact of a temporary loss of one of these facilities should be thoroughly assessed and mitigated as appropriate. Consideration should be given to transitioning these facilities to Contractor-Owned, Contractor-Operated.

**Research and Development.** Government must play a more active role in encouraging research and development efforts. This goes beyond protecting funding for such activities and should involve more threat-based information awareness for arms producers.

**Acquisition Reform.** The impact of governmental acquisition practices on industry was a focal point for the seminar. The desire to spur innovation, secure best pricing, and meet requirements according to schedule have resulted in a multitude of strategies and policies. Both the government and the commercial sector would be best served by simplifying existing processes, providing clarity with regard to requirements, and consistency in completing the acquisition of systems.<sup>70</sup>

With the timely implementation of recommended reforms, the Weapons industry will remain – as it is today – a solid foundation upon which the Department can rely for timely, high-quality and cost effective material solutions to Service requirements in support of National Security demands.





## APPENDIX A

In terms of political impacts, the debate over gun control in the US has had a generally positive impact on the small arms industry. Fears of scarcity have caused significant increases in purchases of firearms, ammunition, and accessories. Socially, the impact on the industry is changing at a rapid pace. In the short term, new groups of people are expanding the market including women and young adults. This shift in the market is greatly shaping future trends. As interest and enthusiasm for the sport of shooting are becoming more socially acceptable to a wider consumer base, predictions for a long-term positive effect of growth and expansion of the industry are plausible.

One of the most significant political impacts to the firearms industry was the 1994 Assault Weapons Ban. This law prohibited the “manufacture, sale, and possession of specific makes and models of military-style semiautomatic firearms and other semiautomatics with multiple military-style features (detachable magazines, flash suppressors, folding rifle stocks, and threaded barrels for attaching silencers) and outlaws most large capacity magazines (ammunition feeding devices) capable of holding more than 10 rounds of ammunition. Weapons and magazines manufactured prior to September 13, 1994, [were] exempt from the ban.”<sup>71</sup> The ban was adopted with a 10-year sunset clause that would not be renewed unless voted for by Congress, which did not occur, and the law has since expired. The market for assault weapons essentially doubled as the law was being deliberated in Congress and the market panic continued for a short period after the law was passed. The ban initially provided a short-term boom for assault weapons and high capacity magazine manufacturers. “Fueled by the pre-ban speculative price boom, production of assault weapons surged in the months leading up to the ban. Estimates based on BATF [Bureau of Alcohol, Tobacco, and Firearms] gun production data suggest that the annual production of five categories of assault weapons and legal substitutes rose by more than 120 percent, from an estimated average of 91,000 guns annually between 1989 and 1993 to about 204,000 in 1994, more than 1 year’s extra supply.”<sup>72</sup> This anti-gun legislation ended up driving up the market for the very weapons that the legislation was intending to ban.

Pro-gun legislation when passed can also make a significant impact to the firearms industry as well. On October 26, 2005, the Protection of Lawful Commerce in Arms Act was signed into law.<sup>73</sup> This piece of pro-industry legislation has had long-term positive impacts on firearms manufacturers by not allowing lawsuits based on criminal conduct or unlawful use by a third party to be brought against sellers or manufacturers of firearms and ammunition. The act also required that existing lawsuits of this nature against the sellers or manufacturers of firearms and ammunition be dismissed. This legislation gave the firearms industry the freedom to explore new innovation and manufacture guns without the fear of lawsuits that threatened to bankrupt the industry.

Occasionally, even the expected threat of legislation can cause surges in sales. President Obama’s voting record in the Senate before his election to President stirred up fear of strict gun control through Executive legislation once he was elected President. “The National Shooting Sports Foundation reported the economic impact of the firearms industry increased from \$19 billion in 2008 to \$31 billion in 2011, ... President Barack Obama was the ‘gun salesman of the year’ for 2012. More than 8.57 million guns were produced in 2012, up 31 percent from 6.54 million in 2011. Almost as many guns (26.1 million) were produced during Democrat Barack Obama’s first term as president as during the entire eight-year presidency of his Republican predecessor, George W. Bush.”<sup>74</sup>



Social factors have also had significant impacts on the firearms industry, which has expanded rapidly in the short-term and promises a positive long-term outlook. The sport of target shooting, hunting, personal protection, and gun ownership has become more popular and socially acceptable in recent years to young adults and especially women. The number of women shooters, hunters, and gun owners has increased dramatically in the last 15 years. Women shooters are one of the fastest growing segments in shooting sports. In 2001, 10 percent of hunters were women as compared to 19 percent in 2013. Women shooters spend an average of \$870 per year on firearms and \$405 on accessories annually. Seventy-three percent of women shooters have taken a firearms training class and approximately 43 percent of women gun owners shoot at least once per month. The most popular firearms for women are semi-automatic pistols followed by revolvers and shotguns. In 2013, firearms retailers estimated that 20 percent of their sales were to women. Glock has marketed to women shooters through an aggressive marketing campaign featuring female focused ads.<sup>75</sup> Youth shooting has also been on the rise. The Boy Scouts of America report that the shotgun shooting merit badge has increased almost 28 percent from 1999-2010. The US Fish and Wildlife Service reports that the number of small and large game hunters has increased by 9 percent from 2006-2011.<sup>76</sup> The increasing demand for firearms has done a tremendous amount to boost sales in the \$4.1 billion shooting industry despite an otherwise stagnant economy in the United States.

Firearms manufacturers have been able to maintain their workforce, reinvest capital back into their companies, and continue to improve current products as well as develop new and more innovative firearms in response to a wide variety of political, social, and economic factors that will have short-term and long-lasting impacts on the firearms industry.



---

## End Notes

<sup>1</sup> See Appendix A

<sup>2</sup> Thermal cores are the key component in the supply chain for these systems. They are extremely difficult and time consuming to manufacture to the size, quality, and longevity required for advanced imaging systems.

<sup>3</sup> See Essay by Michael Quinn beginning on page 14

<sup>4</sup> Department of Defense. 2014. *Quadrennial Defense Review*: 7.

<sup>5</sup> Fergusson, Ian F. and Paul K. Kerr. 2014. "The US Export Control System and the President's Reform Initiative.". *Congressional Research Service: Report*: 1-32, <https://nduezproxy.idm.oclc.org/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=tsh&AN=94425445&site=ehost-live&scope=site>.

<sup>6</sup> Keppler, Elise. 2001. "Preventing Human Rights Abuses by Regulating Arms Brokering: The US Brokering Amendment to the Arms Export Control Act." 19 *Berkeley J. Int'l Law*: 384.

<sup>7</sup> Joint Munitions Command. 2011. *History of the Ammunition Industrial Base*: 11. <http://www.jmc.army.mil/Docs/History/Ammunition%20Industrial%20Base%20v2%20-%202010%20update.pdf>.

<sup>8</sup> Devore, Marc R. 2013. "Arms Production in the Global Village: Options for Adapting to Defense Industrial Globalization." In *Security Studies*: 533.

<sup>9</sup> Moriarty, J. Thomas. "Outgunned?" *Foreign Affairs* 92, no. 2 (March 2013): 177-178. *Academic Search Premier*, EBSCOhost (accessed January 2, 2015).

<sup>10</sup> Kusiolek, Richard. 2008. "ITAR Dilemma: Finding the Balance between Regulation and Profit." *VIA Satellite* 23, no. 7: 7-7. <https://nduezproxy.idm.oclc.org/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=buh&AN=33236350&site=ehost-live&scope=site>.

<sup>11</sup> Devore, Marc R. 2013. "Arms Production in the Global Village: Options for Adapting to Defense Industrial Globalization." In *Security Studies*: 533.

<sup>12</sup> Quinn, Michael (2014-2015) [In person interviews, and Q&A forums]

<sup>13</sup> Boggs, C., Gilbert, J., Reinhart, P., Thomas, D., Vanyo, B., Threat Support Improvement for DoD Acquisition Programs, *Defense Acquisition Technology, and Logistics*, March-April 2014

<sup>14</sup> Movahedi-nia-Jafar, Passive Defense, Center for Planning and Writing Textbooks, Tehran, Iran. 2004

<sup>15</sup> North Korea Lines up Decoy Artillery Batteries, Chosun Media, The Chosunilbo, Dec 2010 [Quotes by South Korean Military Officer citing North Korea developing sophisticated camouflage decoys to avoid ISR and ]recision bombing.]

<sup>16</sup> Uniforce Website, Chinese Decoy Manufacturing Company, [www.uniforce-global.com](http://www.uniforce-global.com) Accessed March 2015

<sup>17</sup> Rusbal Website, Russian Decoy Manufacturing Company, [www.rusdecoy.com](http://www.rusdecoy.com) Accessed Mar 2015

<sup>18</sup> Russia's High-Tech Inflatable Weapons, ABC News Special, Oct 2010, <http://abcnews.go.com/International/video/russia-considers-inflatable-military-weapons-11858590>

<sup>19</sup> Kopp, C., Reassessing Iran's Air Defenses, *Air Power Australia*, July 2010



- 
- <sup>20</sup> Boggs, C., Gilbert, J., Reinhart, P., Thomas, D., Vanyo, B., Threat Support Improvement for DoD Acquisition Programs, *Defense Acquisition Technology, and Logistics*, March-April 2014
- <sup>21</sup> Boggs, C., Gilbert, J., Reinhart, P., Thomas, D., Vanyo, B., Threat Support Improvement for DoD Acquisition Programs, *Defense Acquisition Technology, and Logistics*, March-April 2014
- <sup>22</sup> Thompson, M., The Great Scud Hunt, *Time Magazine*, 15 Dec 2002
- <sup>23</sup> Thompson, M., The Great Scud Hunt, *Time Magazine*, 15 Dec 2002
- <sup>24</sup> Cohen, E. A., Gulf War Air Power Survey (1993). *Gulf War Air Power Survey*, Washington D.C.: Office of the Secretary of the Air Force
- <sup>25</sup> Ibid
- <sup>26</sup> Norton-Taylor, R., How the Serb Army Escaped NATO, *The Guardian*, Mar 2000
- <sup>27</sup> Ibid
- <sup>28</sup> Andrew, M. Revisiting the Lessons of Operation Allied Force, *Air Power Australia*., June 2009
- <sup>29</sup> Movahedi-nia-Jafar, Passive Defense, Center for Planning and Writing Textbooks, Tehran, Iran. 2004
- <sup>30</sup> Andrew, M. Revisiting the Lessons of Operation Allied Force, *Air Power Australia*., June 2009
- <sup>31</sup> Website Search on Alibab for Military Decoy, [http://www.alibaba.com/trade/search?fsb=y&IndexArea=product\\_en&CatId=&SearchText=military+decoys](http://www.alibaba.com/trade/search?fsb=y&IndexArea=product_en&CatId=&SearchText=military+decoys)
- <sup>32</sup> Annual Report to Congress – Military and Security Developments Involving the People’s Republic of China 2014, Office of the Secretary of Defense, 2014
- <sup>33</sup> Ibid
- <sup>34</sup> Fergusson, Ian F. and Paul K. Kerr. 2013. "Overview of the U.S. Export Control System." *Congressional Research Service: Report*: 1-9, <https://nduezproxy.idm.oclc.org/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=tsh&AN=94425445&site=ehost-live&scope=site>.
- <sup>35</sup> Fergusson, Ian F. and Paul K. Kerr. 2014. "The U.S. Export Control System and the President's Reform Initiative." *Congressional Research Service: Report*: 1-32, <https://nduezproxy.idm.oclc.org/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=tsh&AN=94425445&site=ehost-live&scope=site>.
- <sup>36</sup> 50 U.S.C. app. § 2402(2)(A) (1994)
- <sup>37</sup> Burstein, Aaron J. 2009. "Trade Secrecy as an Instrument of National Security? Rethinking the Foundations of Economic Espionage." *Ariz. St. L.J.*: 933.
- <sup>38</sup> Department of Defense. 2014. *Quadrennial Defense Review*: 9.
- <sup>39</sup> Department of Defense. 2014. *Quadrennial Defense Review*: 7.
- <sup>40</sup> Burstein, Aaron J. 2009. "Trade Secrecy as an Instrument of National Security? Rethinking the Foundations of Economic Espionage." *Ariz. St. L.J.*: 933.
- <sup>41</sup> Cordesman, Anthony H. 2014. "The Real Revolution in Military Affairs." August 5, accesses February 10, 2015. <http://csis.org/publication/real-revolution-military-affairs>
- <sup>42</sup> Armstrong, Christopher S. 1975. "American Import Controls and Morality in International Trade: An Analysis of Section 307 of the Tariff Act of 1930." *N.Y.U. J. Int'l L. & Pol.*: 19.
- <sup>43</sup> Department of Defense. 2014. *Quadrennial Defense Review*: 6.



---

<sup>44</sup> Owens, Mackubin Thomas. 2004. "The Political Economy of National Defense." In *Strategy and Force Planning, 4th ed.*, 247-261. Newport, RI: Naval War College Press.

<sup>45</sup> Director, International Cooperation, Office of the Under Secretary of Defense (AT&L). 2012. "Chapter 1: Introduction & Background: International Cooperation in Acquisition, Technology and Logistics." In *International Cooperation in Acquisition, Technology and Logistics (IC in AT&L) Handbook, 7th Edition*: 3-4.  
<http://www.acq.osd.mil/ic/Links/handbook.pdf>.

<sup>46</sup> Keppler, Elise. 2001. "Preventing Human Rights Abuses by Regulating Arms Brokering: The U.S. Brokering Amendment to the Arms Export Control Act." 19 *Berkeley J. Int'l Law*: 384.

<sup>47</sup> Hartung, William. 2012. "The International Arms Trade." In *Security Studies: An Introduction*: 442.

<sup>48</sup> Owens, Mackubin Thomas. 2004. "The Political Economy of National Defense." In *Strategy and Force Planning, 4th ed.*, 247-261. Newport, RI: Naval War College Press.

<sup>49</sup> Kimes, Mina. 2011. "America's Hottest Export: Weapons. (cover story)." *Fortune* 163, no. 3 (February 28, 2011): 62-73.

<sup>50</sup> Moriarty, J. Thomas. "Outgunned?" *Foreign Affairs* 92, no. 2 (March 2013): 177-178. *Academic Search Premier*, EBSCOhost (accessed January 2, 2015).

<sup>51</sup> Export.gov, "About Export Control Reform," in *Helping U.S. Companies Export*, last modified October 22, 2012, [http://export.gov/ecr/eg\\_main\\_047329.asp](http://export.gov/ecr/eg_main_047329.asp).

<sup>52</sup> *ibid*, Fergusson and Kerr, 11-19.

<sup>53</sup> Export.gov, "Export Control Reform Initiative Fact Sheet #1: The Basics," in *Helping U.S. Companies Export*, last modified November 27, 2013, [http://export.gov/static/ECR%20Factsheet%201%20-%20The%20Basics%20v%205\\_Latest\\_eg\\_main\\_047472.pdf](http://export.gov/static/ECR%20Factsheet%201%20-%20The%20Basics%20v%205_Latest_eg_main_047472.pdf).

<sup>54</sup> Export.gov, "Export Control Reform Initiative Fact Sheet #5: Improvements for Small Businesses," in *Helping U.S. Companies Export*, last modified November 27, 2013, [http://export.gov/static/ECR%20Factsheet%205%20-%20Benefits%20for%20Small%20Businesses%20v%203\\_Latest\\_eg\\_main\\_047476.pdf](http://export.gov/static/ECR%20Factsheet%205%20-%20Benefits%20for%20Small%20Businesses%20v%203_Latest_eg_main_047476.pdf).

<sup>55</sup> Bennett, John. "McCain Slams \$46B Spent on Axed Programs." *Defense News*. March 26, 2015. Accessed March 27, 2015. <http://www.defensenews.com/story/defense/policy-budget/congress/2015/03/26/mccain-military-budget-reform-waste-invest-technologies/70479472/>.

<sup>56</sup> J. Ronald Fox, *Defense Acquisition Reform, 1960-2009 An Elusive Goal*, Center of Military History, Washington, DC, 2011, xi.

<sup>57</sup> Permanent Subcommittee on Investigations, *DEFENSE ACQUISITION REFORM: WHERE DO WE GO FROM HERE? A Compendium of Views by Leading Experts concepts for Acquisition reform provided to Senate*, 113<sup>th</sup> Cong., 2d sess., 154, (2014).

<sup>58</sup> Harvey Sapolsky, "4 Pieces of Advice for Ash Carter." *The National Interest*. January 18, 2015. Accessed March 20, 2015. <http://nationalinterest.org/feature/4-pieces-advice-ash-carter-12063>.

<sup>59</sup> *Reform of the Defense Acquisition System, United States Senate*, 113<sup>th</sup> Cong. 2014, <http://www.armed-services.senate.gov/imo/media/doc/14-44%20-%2014-30-14.pdf>

<sup>60</sup> Frank Kendall, "Memorandum for the Acquisition Workforce: Department of Defense Instruction 5000.02," Washington, DC, January 7, 2015.



---

<sup>61</sup> Sydney Freedberg. "Army Kills New Carbine, Preempting Congress; Industry Groans, 'Not Again!'" *Breaking Defense*. June 13, 2013. Accessed March 23, 2015. <http://breakingdefense.com/2013/06/army-kills-new-carbine-preempting-congress-industry-groans-not-again/>.

<sup>62</sup> Ibid.

<sup>63</sup> Timothy Greenhaw, "Modular Handgun System (MHS)," National Defense University, March 15, 2015, 7.

<sup>64</sup> Freedberg, "Army Kills New Carbine".

<sup>65</sup> 10--Modular Handgun System, Solicitation Number: W15QKN-13-X-F007, Department of the Army, Army Contracting Command

<sup>66</sup> Greenhaw, "Modular Handgun System", 9.

<sup>67</sup> Agile Acquisition to Retain Technological Edge Act, H. Res. 1597, 114<sup>th</sup> Cong., 1<sup>st</sup> sess., 64, (2015),

<sup>68</sup> Professional Services Council, "The PSC Acquisition and Technology Policy Agenda", July 28, 2014, 19.

<sup>69</sup> Thomas Friedman, interview by Elizabeth Kolbert, *Environment 360*, October 9, 2008, accessed on March 24, 2015, [http://e360.yale.edu/feature/thomas\\_friedman\\_hope\\_for\\_a\\_hot\\_flat\\_and\\_crowded\\_world/2071/](http://e360.yale.edu/feature/thomas_friedman_hope_for_a_hot_flat_and_crowded_world/2071/)

<sup>70</sup> Numerous firms expressed concern over the way in which the Individual Carbine program was cancelled after significant industry efforts in competing, and further discussed concerns that the modular Handgun System would also be cancelled after significant expense to the firms involved.

<sup>71</sup> Roth, Jeffrey, and Christopher Koper. "Impacts of the 1994 Assault." March 1, 1999. Accessed March 22, 2015. <https://www.ncjrs.gov/pdffiles1/173405.pdf>.

<sup>72</sup> Roth, Jeffrey, and Christopher Koper. "Impacts of the 1994 Assault." March 1, 1999. Accessed March 22, 2015. <https://www.ncjrs.gov/pdffiles1/173405.pdf>.

<sup>73</sup> "President Bush Signs "Protection of Lawful Commerce in Arms Act." NRA-ILA. October 26, 2005. Accessed February 15, 2015. <https://www.nraila.org/articles/20051026/president-bush-signs-protection-of-br>.

<sup>74</sup> Tillson, Tom. "Obama Retains 'gun Salesman of the Year' Title as Industry Sales Continue to Explode." *Infowars*. February 22, 2014. Accessed March 23, 2015. <http://www.infowars.com/obama-retains-gun-salesman-of-the-year-title-as-industry-sales-continue-to-explode/>.

<sup>75</sup> "Infographic: Girl Power." NSSF Blog RSS. January 21, 2015. Accessed February 21, 2015. <http://www.nssfblog.com/infographic-girl-power/>.

<sup>76</sup> Minitier, Frank. "What The Left Won't Tell You About The Boom In US Gun Sales." *Forbes*. August 23, 2012. Accessed February 17, 2015. <http://www.forbes.com/sites/frankminiter/2012/08/23/what-the-left-wont-tell-you-about-the-boom-in-u-s-gun-sales/>

