



Statement before the Select Committee on Strategic Competition Between the United States and the Chinese Communist Party on “Rebuilding the Arsenal of Democracy: The Imperative to Strengthen America’s Defense Industrial Base and Workforce.”

The Decline of the United States Defense Industrial Base and the Need to Restore Industrial Deterrence

Dr. William C. Greenwalt

Nonresident Senior Fellow

December 5th, 2024

The American Enterprise Institute (AEI) is a nonpartisan, nonprofit, 501(c)(3) educational organization and does not take institutional positions on any issues. The views expressed in this testimony are those of the author.

The Decline of the United States Defense Industrial Base and the Need to Restore Industrial Deterrence

Chairman Moolenaar, Ranking Member Krishnamoorthi, and other distinguished members of the Committee, I would like to thank you for the opportunity to testify this morning on the need to strengthen America's defense industrial base and workforce.

Restoring the "Arsenal of Democracy" is one of the most important tasks Congress and our nation can embark on in the coming years. This will not be easy as reforms of the last 30 years to address the defense industrial base have proven to be only marginally successful.

We have now reached an inflection point as our industrial deterrence is no longer credible. This is a far cry from the defense industrial base that facilitated our victory in the WWII. The Arsenal of Democracy industrial model, still active in the early Cold War period, may have been the most significant driver of innovation ever created. However, beginning in the early 1960s, the incentives and structure underpinning this approach were systematically destroyed.

How does one go bankrupt? Hemmingway succinctly wrote in "Two ways. Gradually, then suddenly." Processes and ideas put in place in the 1960s and 1970s gradually and incrementally, like barnacles on a wooden ship, undermined our defense industrial base and innovation system over the course of multiple decades. These processes first dissolved the links to the underlying commercial industrial base, then shattered the importance of time constraints to innovation.

Once delinked, the commercial industrial base left the defense industrial base far behind. This was done through massive expenditures in R&D and appropriating the Pentagon's discarded time-based innovation model.¹ DOD then lost the visibility and the ability to impact incremental commercial supply chain decisions, most notably those made when parts of the commercial market unwisely outsourced its production capabilities to China. The result of civil-military disintegration has undermined both national and economic security. As we survey our current situation, it is becoming clearer that we have squandered our longstanding defense and, in many cases, our commercial technological and industrial lead over the rest of world. We are suddenly facing the prospect of industrial bankruptcy.

It is important for Congress after understanding how we got here, to act boldly and urgently to address the failings of the current system. What is needed will require a whole of nation effort that is much bigger than just ramping up a few existing defense production lines – although that is vitally needed as well. To restore industrial deterrence America must attempt to re-create the methods of our earlier success, and then just as we did in WWII, combine them with

¹ Dan Patt and I described the time-based innovation model in: William Greenwalt and Dan Patt, "Competing in Time: Ensuring Capability Advantage and Mission Success Through Adaptable Resource Allocation, Hudson Institute, February 2021.

new sources of innovation and ideas emanating from commercial companies. A new improved and more advanced Arsenal of Democracy awaits to be created based on technological advances currently residing in the commercial market from artificial intelligence, additive and digital manufacturing, the ubiquitous deployment of sensors, and autonomy.

Here are some guiding points that Congress should consider as it approaches ways to rebuild a new Arsenal of Democracy. First, the US defense industrial base is only fully capable when it is integrated with the underlying commercial industrial base. Innovation and ideas flow both ways – from defense to commercial and from commercial to defense. Solving extremely difficult national security problems drives underlying innovation and economic advances. Apart from an exception basis, the current defense management culture and processes (from budgeting to contracting) prevent what was described in the 1990s as the civil-military integration (CMI) of the industrial base or what China now calls military-civil fusion. Every unique government requirement has a lost innovation cost beyond just the costs of compliance when commercial companies leave the market. The stand-alone and isolated traditional defense industrial base is the logical outcome to the incentives and oversight mechanisms created in law and regulation. The exceptions to these rules to achieve CMI have proved difficult for DOD to use and even the limited uses of those exceptions are under threat within the defense bureaucracy. Sustained Congressional support is necessary to overcome risk averse behavior in the Pentagon and the rest of government.

The Sources of the WWII Arsenal of Democracy Innovation Model

In WWII and the early Cold War, the US created what may be the greatest innovation model that has ever existed. This was likely accidental. There was no guarantee that America would succeed in a global conflict with Nazi Germany or Imperial Japan. Demobilization after the First World War decimated the arms industry in the 1920s and cut ties with the emerging technologies of the day in aircraft, telecommunications, and the auto industry. Arms control limitations contained in the Washington Naval Treaty of 1922 and its successors constrained shipbuilding while the 1930's Nye Committee belief about WWI profiteering in the "Merchants of Death" narrative limited defense investment in general. The US would have been even more unprepared for war if not for the members of Congress who supported granting limited experimentation authorities in the 1920s that were used to develop aviation concepts and capabilities, and the naval buildup authorized by the 1934 Vinson-Trammell Act and Naval Acts of 1936 and 1938. US arms sales in 1939 through "cash and carry" contracts to the United Kingdom and France and then Lend-Lease in 1941 began to prime the pump of US defense industrial mobilization.

Still, it was not until 1942 that the US turned to fully commit its industrial base to war. This industrial base was to be primarily commercial as in every previous conflict the government-run arsenals were overwhelmed and could not meet demand. Auto, appliance, and cereal factories shifted to making arms and supporting the war effort. US industrial capacity would now serve both defense and commercial needs as wise policy decisions made in the urgency of the war

made it easier to merge the two separate industrial bases. As Arthur Herman in his history *Freedom's Forge* documented, production knowledge was transferred from commercial industry to the problem of how to build aircrafts, ships, munitions, and tanks at scale. What was critical but perhaps less emphasized was the U.S. government subsidized and provided dual use machine tools to re-tool an American commercial industry that had not invested in itself since before the Great Depression. This wartime investment in plant and equipment would assure American commercial dominance until the 1970s.

But it was more than this just the coming together of the civil and military industrial bases that drove American industrial dominance. In the midst of global conflict, the United States stumbled upon an innovation model that was also to assure military technology primacy in the early phases of the Cold War and jumpstart several new commercial industries. This model initially was driven by urgency and the constraints of time. Serial time-constrained operational prototyping of new concepts, technologies, and platforms created by the best and brightest scientists and engineers were then battle tested by operators in the field to determine what items to produce at scale. Technology transfer from the British in the Tizard Mission of 1940 leveled up the base of knowledge on which the US could innovate from and began the close allied technology cooperation that continued throughout the war and beyond. Operations research based on observable data informed how to quickly pivot to solving problems and make changes to existing equipment, much as software upgrades are made today. Competition in approaches to problem solving drove new ideas and capabilities. Everything was ruthlessly constrained by a sense of time and urgency.

As a result, World War II saw the US military deliver a remarkable string of time-driven innovations in weapon systems (from the P-51 Mustang to the atom bomb). This was a unique period for disruptive defense technological developments, because time was clearly the pacing factor on innovation. While other inputs such as labor, capital, management, and knowledge were important, there was only so much one could do to use and incorporate them in a fixed amount of time driven by a two-theater war. Time focuses efforts and weeds out technologies and ideas that are not yet ready to operationalize. It can, if allowed to, constrain bureaucracy, calling for responsive industrial base and engineering incentives and methods. During World War II, significant advances were made in the mass production of new military items using technologies such as radar, sonar, computing and electronic warfare, and of course nuclear weapons.

At the end of WWII, the United States and its newly founded "Arsenal of Democracy" stood like a colossus surveying a ruined world. The onset of the Cold War and visionary leaders ensured that something extremely unique happened in US defense industrial policy. Unlike all previous post-war demobilizations, the US government did not immediately sever the links between the commercial and defense industrial bases and return to the government run arsenal model to meet its future needs. It was Eisenhower who saw the importance of keeping the commercial industrial base focused on defense and Vannevar Bush who argued for the need to maintain scientific R&D to provide the intellectual foundation for these efforts. This view was reflected in a 1946 memo to the Army from then General Eisenhower which stated:

“The recent conflict has demonstrated more convincingly than ever before the strength or our nation can best derive from the integration of all of our national resources in time of war. It is of the utmost importance that the lessons of this experience be not forgotten.... The future security of the nation demands that all those civilian resources which by conversion or redirection constitute our main support in time of emergency be associated closely with the activities of the Army in time of peace. The armed forces could not have won the war alone. Scientists and business men contributed techniques and weapons which enabled us to outwit and overwhelm the enemy.”²

These two leaders in the late 1940s essentially put the US on the path to winning the Cold War. As a result of maintaining and institutionalizing the wartime model, this early Cold War period saw America innovating at an unprecedented scale and speed. This resulted from more than just CMI or even the resources directed at defense, which were substantial as measured on a percentage of GDP basis. A new industrial model had been created based on the wartime experience founded on a sense of urgency in the government that led to quick reaction and decision times and leveraged national investments in plant, equipment, science and engineering.

The early Cold War competition with the Soviet Union thus incentivized the US military to maintain these World War II development emphases. Innovation efforts conducted during the war, in the 1950s, and then in the subsequent space race with the Soviet Union in the 1960s had several things in common: a focus on time, rapid experimentation, multiple technological pathways, and rapid operational prototyping. These efforts for the most part took less than five years to deploy something that was operationally capable and usable. It might have eventually taken a second, third, or more prototype iterations to resolve bugs and finalize the model to produce in quantity, but each of the earlier prototypes were useful operationally and drove technical and operational learning. In some cases, these prototypes may have been all that were needed and there was never a need to produce more. For example, the first U-2 reconnaissance plane was flying nine months after signing a contract. After Gary Powers' U-2 was shot down over Russia in 1960, work began on the U-2's successor. The A-12 prototype flew in 1962 and evolved into the SR-71, which flew in 1964.

America in the span of a little more than a decade created multiple versions of the first jet aircraft, nuclear powered submarines and ships, hydrogen weapons, the first ICBMs, and first reconnaissance satellites. These systems were essentially operational prototypes of new revolutionary capabilities that were all created in less than five years from idea to deployment. At the same time the US was producing more traditional munitions and platforms at scale and became the dominant commercial manufacturer to the world.

During the 1950s this industrial model continued to be refined and improved. The initial

² Memorandum from Army Chief of Staff Dwight D Eisenhower on Scientific and Technological Resources as Military Assets, April 30, 1946.

baseline supply of scientists and engineers that incorporated the European diaspora from the 1930s was expanded by the GI Bill, or the Servicemen's Readjustment Act of 1944, and then again in the 1958 National Defense Education Act. The Department of Defense became the initial venture capitalist to commercial industry with R&D investments and initial buys spurring on new industries in microelectronics and computing, and serving as the launch customer for the Boeing 707 aircraft in the guise of the KC-135 tanker. That the DOD's efforts resemble how Silicon Valley and the venture capital market evolved since the 1960s is perhaps no surprise. Silicon Valley had its origin in the US radar market and then in the development of miniaturized electronics to support the ICBM program of the 1950s and 1960s. Many of the initial founders were well familiar with the defense market and its practices of the time.

The Decline of the United States Defense Industrial Base

This Golden Age of US defense innovation lasted less than two decades, with the 1960s becoming a transition decade. The problem with successful innovation is that it can be messy and unpredictable. Investing in multiple pathways where many of those paths end up failing seems inefficient and wasteful. It can be. This is why the venture capital market is ruthless about picking winners and losers as it considers what companies to invest in later funding rounds. The process is serial and only operational success should lead to more money. This was not the path DOD took in the 1960s.

Central planning and linear step by step processes would replace the free-for-all of competitive experimentation and a humbler wait and see approach to what works. Sputnik rattled the nation and offered the narrative that Soviet style central planning was superior to American capitalism and merciless competition. Systems analysis (an outgrowth of operations research but which then become divorced from time) was being nurtured at RAND and offered a hubristic scientific approach to management. Cost data became to be seen as the measuring device to discipline and guide management processes. Secretary of Defense McNamara, having used these principles at Ford, brought them to the Pentagon in 1961 in the Planning, Programming, and Budget System (PPBS -- now called the PPBE budget process).

After establishing PPBS, defense management practices were significantly modified in the 1960s and 1970s to reflect this greater cost-based emphasis. This rested on a belief that a more centrally-managed focus on planned predictive outcomes could be achieved that culminated in a new centralized-management framework based on systems analysis, program budgeting, and cost analysis. This management system emerged in a series of controlling institutions and regimes designed to oversee defense innovation. It eventually became engrained in culture and administered within the military structure and bureaucracy that was stood up after World War II to give greater centralized control in the Office of the Secretary of Defense.

The further incremental evolution of the institutions and regimes associated with the original changes made in the 1960s to defense management continued to develop in the subsequent six decades. While the overall basic premises and objectives of the 1960s framework did not change, the management regimes matured and became even more prescriptive and

compliance oriented over time. This process was incremental and began with ideas that generated policy frameworks, which grew into institutions, which were then further modified by implementation regimes and protected by interests in the new status quo.

Both the acquisition process enshrined in the 5000 series of DOD instructions and the Joint Capabilities Integration and Development System (JCIDS) requirements process developed around the principles of the PPBE. Congress incorporated PPBE principles in its annual defense appropriations process (although wisely did not for other agencies) and then created the mechanisms for generating specific and unique non-commercial cost data through the Truth in Negotiations Act of 1962 and the creation of the Cost Accounting Standards in 1970. Much of the damage to the system had already been done by the time the Competition in Contracting Act of 1984 was passed that added its own unique non-commercial set of processes.

The result was the creation of a system where urgency and time were sacrificed to central planning and linear, step-by-step processes. Starting with a 2–3-year time period for requirements generation, the 2-3 years to move a program through the PPBE and appropriations process, the two years to compete a contract, and the decade or so to move through the acquisition process, DOD's acquisition and innovation process came to a crawl. The traditional acquisition system has seen decision time to start a program and get it on contract rise from less than a year in the 1950s to closer to 9 years today, while time to initial operational capability or new innovation in the field has gone from 4 years to 10-20 years.

How did this impact the industrial base? Initially, commercial firms when faced with new non-commercial compliance regimes split their companies – creating new government facing subsidiaries that would not negatively impact the culture or practices of the parent company. Eventually, culminating in the great sell off of defense companies and subsidiaries in the wake of Secretary Bill Perry's "Last Supper" in 1993, these commercial companies divested their defense holdings until only five defense prime contractors were left. In essence the DOD returned to the monopolistic arsenal system of the past, only with the ownership being in the commercial market rather than with the government.

The industrial base has in essence conformed to the incentives of a unique non-commercial market. Companies who still wanted to remain in defense had to create government facing businesses specialized in the arcaneness of government procurement regulations and processes. Most importantly, time-based innovation was driven from the system. Large scale manufacturing became a thing of the past as new programs were planned to be produced first at uneconomic levels and then due to budget constraints never would enter full-scale economic production (See F-22 and B-2 as examples). Programs became focused on building exquisite handcrafted unique items over long time periods. The Arsenal of Democracy was transformed into something more akin to the Artisans of Democracy.

Once this system was established, the only way to innovate quickly or produce at scale was to take defense programs outside of the traditional acquisition and budgeting system. This was seen first with most intelligence and special access programs, stealth and precision guided

munitions in the 1970s, autonomous systems from the 1990s, the Mine-Resistant Ambush Protected (MRAP) vehicles and Counter-IED programs of the 2000s, space launch and the rise of SpaceX in the 2010s, and most recently with the COVID vaccine supported by the Army.

Perhaps the most significant trend of recent history to call into question U.S. technological dominance is that defense innovation is no longer led by government direction and support as it was at the height of the Cold War. The commercial market has become the leading source of innovation in many areas of relevance to national security. Advances made by Silicon Valley in artificial intelligence, data analytics, robotics, autonomous systems, and quantum computing are at the forefront of recent DOD and other countries' interest in the future applications of these technologies in weapon systems. From an industrial base standpoint, the most innovative sources of these new "enabling technologies" are in the civilian sector, not the defense sector.

The trend was first noticed in 1980 when U.S. private R&D first overtook U.S. government R&D. From parity in 1980, the U.S. government's share of U.S. R&D has been rapidly falling ever since. Unlike in the 1950s and 1960s, DOD is no longer the driver of innovation in the U.S. This commercial R&D trend also subsequently led to a technological leveling of key dual-use technologies on a global scale as global R&D began to dwarf combined U.S. governmental and commercial R&D.

Where We Are Today

Despite spending significant resources on defense over the last two decades, the U.S. has allowed its technological dominance to decline. The weapon systems dominance gained from technology developed in the 1970s, produced in the 1980s, and visibly displayed in the Gulf War, was allowed to atrophy as the knowledge of how to build these weapons proliferated. Next, the Pentagon has rapidly fallen behind the commercial sector. Commercial industry continues to move at the speed of Moore's law while DOD acquisition moves at the speed of its outmoded linear processes and bureaucracy. Commercial innovation is in the process of revolutionizing defense and now dominates 11 of the 14 technologies that DOD has identified as critical to its future. Even in the three areas that DOD has identified as defense-specific, there is a significant commercial interest and future application, just as was the case with defense-specific space technology decades ago.

Despite these trends, there is yet no sense of urgency that there is a problem. Defense management systems and the industrial base continue to be optimized for a peacetime cadence after 30 years without a great power conflict. It took decades to get to this point and without focused leadership there is little chance DOD will adjust to this new set of circumstances. Process compliance is our most valued objective rather than time. Time to operational capability has been the primary historical forcing function for disruptive innovation, and yet it is not valued in DOD. Just as was the case in the Soviet Union, centrally planned, linear, predictive processes and hubristic mindsets have destroyed innovation and creativity.

Budget inflexibility in the year of execution and long lead times to allocate resources are one of the root causes of our declining competitiveness and innovation failures (especially in the many versions of the Valley of Death).³ The predictive and lumbering requirements process forecloses innovation opportunities from the start as it is the gateway to the acquisition and budgeting system. Operational interests are not aligned or supported within the acquisition and budgeting systems – both at the combatant command and service component command levels. The barriers to civil-military integration of the industrial base have continued to widen as DOD prefers to dictate solutions to defense unique monopoly providers that have taken on many of the characteristics of pre-WWII government run arsenals.

Points to Consider: A Roadmap to Restoring Industrial Deterrence

It is not too late to restore industrial deterrence. America's economy is strong and has some of the most innovative commercial sectors in the world – at least for now. The hand that we have been dealt is still a good one, but that does not mean that sacrifices or trade-offs in priorities will not have to be made. The following is a roadmap of ideas to consider for restoring industrial deterrence which is both about production and the ability to innovate at scale. America needs to do both.

The first step is to restore a sense of urgency and time. The US government needs to pivot to the mindset that we are now in an emergency situation and then act like it. We need a plan of what to do in the near term (0-2 years) and what to do in the medium term (3-5 years). Planning, preparing, and then doing what is necessary as if we will be at war with China in the next three years is probably the best way to ensure that we will not be at war with China during this time. Deterrence is an insurance policy. We must pay back the premiums we have neglected to pay over the decades to restore this deterrence. If China knows we can't produce and sustain our military forces in a great power conflict, the chance of warfare will be that much greater.

We must focus on near term production and near-term Innovation which will require the restoration of CMI. We will also need to invest in people, basic research, and new machinery and manufacturing techniques that will benefit both the defense and civilian sectors of the economy. All of this investment must be clearly focused on competitiveness and not be encumbered with other social policy goals that, while perhaps being legitimate and worthy objectives, have weighed down implementation and destroyed time-based innovation and production. From a defense perspective, we need to better understand and de-risk the global supply chain and re-evaluate the efficacy of our geo-economic tool kit of stockpiles, sanctions, direct foreign investment reviews, arms export controls, and tariffs. Finally, we must clearly

³ The Valley of Death refers to the inability to move a good idea or program to the next phases of development. The inability to move money quickly forces these ideas and programs to queue up for 3 years to obtain any option of funding. By this time start-up companies have either failed or moved on with their critical engineering talent to something else.

leverage one of our national strengths and comparative advantages which is a technologically sophisticated and economically advanced set of close allies who share our values.

Initial Emergency Production Ramp Up of Legacy Munitions Systems at Scale: The next step is to buy time. As this Committee likely found in its recent wargame with CSIS, in a conflict with China we would quickly run out of munitions and it will take years to replace them.⁴ We have to resolve this problem immediately. This will require additional resources, but for the most part existing acquisition and budget processes can be made to work to do this. DOD and Congress just need to leverage current exceptions to these processes to include multiyear and emergency procurement authorities.

This is a money but also a capacity problem. Supplemental funds or a shift in funding priorities within the existing budget could be used to increase the supply of existing munitions. There is also the option as this Committee's former Chairman, Rep. Gallagher illustrated in his FIRES Act legislative proposal that expiring or cancelled appropriations funds could be shifted to pay for any increase. Still, even with new resources it will take the existing industrial base several years to ramp up production. We also may need multiple lines to produce these legacy systems. DOD should be looking for alternatives to build second lines from contractor run depots and arsenals to our allies.

Still, even if successful, increasing our supply of munitions would merely put a dent in restoring the balance of power and put us back on the road to parity in the INDOPACOM theater. More needs to be done.

Deregulate Processes to Focus on Time to Capability: The Pentagon needs to restore the importance of time in the acquisition and budgeting processes. To compete with China, it needs to run faster and focus on serial, operational prototyping of new capabilities and continuous innovation just as we did in WWII and the early Cold War. DOD must foster this innovation through competitive experimentation and iterative testing and deployment, which will drive efficiency and responsiveness within the industrial base. A time-based iterative approach will create the need to streamline procurement processes to reduce delays and cost inefficiencies, enabling faster integration of new technologies. This is crucial for an agile defense industrial base that can meet evolving demands. There are pockets of innovation in the Pentagon such as the Space Development Agency and the Defense Innovation Unit that have shifted to a time-based approach. The exception now needs to become the rule.

Requirements: The requirements process should be completely overhauled to enable acting on new opportunities within 30 days. If the military cannot meet that timeline, DOD and Congress should consider eliminating the JCIDS process, saving 2-3 years from the acquisition process.

⁴ Seth Jones, "The Defense Industrial Base Won't Deter China" *Wall Street Journal*, November 26, 2024

Acquisition: We no longer have the luxury and time to develop capabilities in 10–15-year timeframes. The major capabilities pathway and processes should only be pursued for existing weapons systems that are already in production, are fully proven, and that we are buying at scale. All other development and initial production should happen through the time-based use of the Middle Tier of Acquisition (MTA) authority created by Congress in 2016 to go around the traditional acquisition system if capability is delivered within 3-5 years. Rapid Acquisition (RAA) authorities designed to deliver capabilities within 2 years and created by DOD and Congress after 9/11 should be leveraged as should a greater focus on buying solutions as a service.

Contracting: A 2-year process to award a contract is unacceptable. Emergency authorities, Other Transaction Authority (OTAs), and experimental authority should be primarily used in the next 5 years. If contracts lead-time has not been reduced to less than 90 days Congress should look to providing additional authorities to speed up contracting. Congress should consider whether bid protests should be suspended on an emergency basis for the next 5 years to correspond to the period of maximum danger of a conflict with China. Congress and the Secretary of Defense should waive or exempt all extraneous contracting requirements that do not explicitly meet the needs of the combatant commanders who will use the capability. New IDIQ and consortia OTA contracting vehicles should be established to put each industrial sector on the equivalent of speed dial to award contracts quickly when needed. This was done with the pharmaceutical industry prior to the pandemic and should be replicated across the US economy.

Budget: As a first step, Congress and DOD should immediately implement the recommendations of the PPBE commission. Still, the Commission’s recommendations took a minimalist approach and much more needs to be done. DOD should implement a departmentwide portfolio budgeting approach to allow greater flexibility in stopping and starting programs. Acquisition capability efforts should be able to be started with rapid funding authorities in year of execution, dramatically reducing decision time. This can be done by creating additional funds to support portfolio acquisition management and by bolstering past funds and authorities established to repurpose expiring funds through congressionally-created accounts such as the Defense Modernization Account, the Rapid Prototyping Fund (“Section 804” fund), RAA budget authority, and for personnel skill shortfalls, the now defunct Defense Acquisition Workforce Development Fund. The mindset of budgeting should shift to acting more like a venture capitalist in the innovation portion of the acquisition process and toward private equity when investing in more mature programs and capabilities. If the culture does not change at DOD’s budgeting, finance, and program evaluation shops, these organizations should be abolished or reorganized.

Restore Civil Military Integration (CMI) Between the Commercial and Defense Industrial

Bases: CMI is essential for maintaining technological superiority within the defense industrial base. Time based acquisition will work best by leveraging the commercial market where time

to development and capability is still valued and where many of the new technologies needed by defense reside.

Restoring CMI will need to go much further than past efforts such were seen in the Federal Acquisition Streamlining Act of 1994, the Clinger-Cohen Act of 1996, and the McCain-Thornberry reforms contained in the 2016-18 NDAs. This will require no less than a complete restructuring of the processes, incentives, and culture behind our defense requirements, acquisition, contracting, budgeting, and technology control systems. It will also require a shift to the time-based innovation approach that emulates the practices of the venture capital market of today or of a defense program from the 1950s.

Commercial Preference: The first step to improving CMI is to start by Congress mandating the commercial preference in law (that has existed since 1994) to the development of all software to be bought and developed at the Department of Defense. US commercial software expertise is world leading and DOD must maximize this source of innovation. Waiving this commercial mandate should only be considered at the Secretary of Defense level.

Fixed Price Contracts: Congress should re-establish the preference for fixed price defense contracts that was unwisely repealed a few years ago. The real commercial world does not use cost contracts, will not comply with government unique mandates for cost and pricing data (TINA), nor adhere to the Cost Accounting Standards (CAS). These government unique mandates only serve as a barrier to entry to the government market and drive-up costs when the government develops and pays for solutions. Congress should mandate that any follow-on contracts to an initially competed fixed price contract shall not use a cost contract and TINA shall not apply. Commercial contracts are value and price based and DOD needs to learn how to price value. Software, RAA and MTA acquisition pathways should all be conducted on a fixed price basis. Fixed price contracts should be time based (no longer than 5 years) to prevent the industrial base damage and financial losses that the Air Force is currently inflicting on Boeing and other traditional defense contractors.

Commercial Contracting: Moving away from the government unique cost contract structure is critical to the success of re-creating the Arsenal of Democracy. All contractors who are not covered by full CAS requirements should be required to only contract with DOD using fixed price Federal Acquisition Regulations (FAR) Part 12 contracts or OTAs.⁵ Traditional cost type contractors should be encouraged to create commercial subsidiaries or “commercial entities” to compete for new contracts. Commercial contracting mechanisms such as FAR 12, OTAs, and experimental authority (10 USC 4023) should eliminate all non-commercial requirements and contracting clauses that are not deemed vital to supporting the warfighter.

⁵ OTAs are perhaps most famous for being used by NASA to develop SpaceX’s Falcon 9 rocket by bypassing the traditional acquisition, development and contracting process.

Intellectual Property (IP): Congress should protect commercial IP rights but may want to consider limitations for some types of modified commercial products used for defense purposes – perhaps to a set period of time such as 10 years. When technologies are moving at the speed of Moore’s law, most commercial companies have long moved on to new solutions and approaches and no longer support their older versions of technology. This IP is then often sold to another company. DOD when it keeps systems for decades longer than it should, opens itself up to spare parts shortages and higher prices for these older technologies owned by monopoly providers.

MOSA: There should also be a greater mandate for using the Modular Open System Approach (MOSA) through periodic competitions for applicable subsystems which would also limit the concerns over any potential IP lock. Modular buying approaches and a quicker replacement of systems may be a better approach than limiting IP rights that could limit parts of the industrial base willing to do business with the government.

ITAR: Congress should also consider creating a commercial exception to International Traffic in Arms Regulations (ITAR) that applies to all commercially developed and modified commercial items created for the Department of Defense. This approach would provide clarity in jurisdictions for their technologies by moving the jurisdiction for these items under the Department of Commerce. The threat of ITAR contamination has been a barrier to some companies working on national security solutions.

Certifications: Finally, to address parts obsolescence and enhance competition the Authority to Operate (ATO), supply chain certification and qualification processes need to be thoroughly reviewed, reformed, and streamlined to ensure that new sources of supply for software, spare parts and components can be brought on line quickly to support DOD. The time it now takes to make changes in systems is no longer tenable and is holding back innovation in the Department.

Enable Serial Platform Modernization: At this point in our competition with China we need to recognize that every weapons line in existence today, no matter the pathway and how long it took to create, is a national asset. Closing any of them down is unwise at this moment. The US needs a plan to ramp up production at every one of these facilities regardless of current need as the time to do so in an emergency is usually around 18–24-months if it is even possible. We have to reduce this time to increased production. This will not be an easy task, as we are seeing in the industrial base workforce and capacity challenges, most significantly in shipbuilding. DOD needs to look at leveraging commercial manufacturing processes and companies just as the US did with the auto industry in WWII. The auto, electronics, and consumer industries can still do production at scale. New serial and rapid manufacturing advances seen being used in Formula 1 racing also offer potential lessons learned.

As we look to compete with China our horizons may need to look to new ideas for disruption.

We should think about planning for the conversion of commercial airlines into weapons carrying platforms. Older platforms could be converted to becoming cruise missile carriers. Much can be done with leveraging shipping containers and cargo ships. New munitions and drones should be able to be launched from P-8s and other existing platforms. The future world will likely involve intercontinental swarming drones and the US needs to be ready for that both offensively and defensively. Missile defenses need to be improved and our nuclear deterrent modernized.

None of this will be cheap. We should consider creating a National Defense Modernization Fund (NDMF) linked to the number of platforms and capabilities we need to build to and set this money aside from the discretionary portion of the defense budget. On a set timeframe of depreciation for these platforms (and with adjustments for inflation) the NDMF should be then automatically replenished. Maintaining a Navy and raising and supporting an Army are constitutional responsibilities and in today's increasingly dangerous world really shouldn't be thought of as a discretionary afterthought anymore.

Address Supply Chain Vulnerabilities by Creating a War Industries Board: 25 years of outsourcing to China has left the US supply chain vulnerable. There is a need to de-risk our supply chain and critical infrastructure, both military and civilian. The first thing is to truly understand what we don't know – i.e., where is China lurking. An interagency War Industries Board should be established when Congress reauthorizes the Defense Production Act to assess and manage the sectors of the economy that will be needed in any future conflict with China. This board should manage our stockpiles and focus on how to decouple and excise vulnerabilities in our supply chain that currently exist. This will require stronger military-industrial collaboration, policies that support U.S. or allied based manufacturing and supply chains, and reducing reliance on suspect foreign suppliers, which will be vital for resilience in times of conflict or supply disruptions.

Supply Chain Shortfalls: The industrial base is still optimized for peacetime. Without demand signals such as in multiyear procurement contracts for munitions, it will be impossible to build up the supply chain. Over the years, more and more businesses have exited the market as production planning and legacy spares buying have been haphazard at best. The use of Defense Production Act authorities can be helpful in keeping some of these companies in the Defense Industrial Base (DIB), but that will continue to be a challenge with a lack of funds. A War Industries Board should focus first on "War Stopper"-type criteria for those companies that will be needed to ramp up production when needed in a crisis.

Supply Chain Illumination: Past attempts to obtain better supply chain illumination have either failed or have been only able to take a snapshot in time. DOD has for the most part outsourced the management of its industrial supply chain to the prime contractors where they have focused on their immediate programs and not on sector-wide vulnerabilities. Advanced data analytics and AI offer the potential to improve supply chain visibility for DOD. The biggest danger to first consider with any such effort

is to determine where China is in the supply chain. Even relatively seemingly mundane commercial technologies like battery separators that ensure that batteries don't blow up are now produced almost entirely in China and could pose a future supply chain issue. Vulnerabilities from Chinese parts in the supply chain need to be identified and the risk assessed. If that vulnerability needs to be mitigated and sourcing moved, DOD will need to look to trusted sources from within the National Technology and Industrial Base (NTIB), our allies, or friendly countries. The most critical items will need to be produced in the US or within our most trusted allies in the NTIB. The Department needs help and an interagency War Industries Board could be useful in identifying and mitigating where China is in our defense and commercial supply chains.

Reauthorize and Strengthen DPA authorities: Both DPA and specific DOD industrial base funding lines like Industrial Base Analysis and Sustainment (IBAS) should be increased to allow for the types of investments that will be needed to enhance and de-risk the supply chain. Tax expenditures could be considered to boost arms production and mitigate supply chain vulnerability through the purchase of new machinery. DPA loan authority should be improved and better leveraged. Congress should consider giving DOD authority to provide either direct loans or loan guarantees to industry, specifically to small business. Emergency DPA authority should be granted to the President to waive environmental regulations and laws to support improvements to the DIB.

Improve the Workforce: The workforce is a two-tier problem impacting both the government and industry. On the government personal side, a focus should be made on speeding the time to hire for acquisition and industrial base positions but also on limiting tenure as the government needs a continuous re-refresh of talent and expertise. One way to do this would be for DOD to better leverage current personnel authorities and the ability to directly hire Highly Qualified Experts (HQE). Congress may want to create a separate Title 10 HQE authority to make it more usable for DOD. It also may want to require the adoption of the DARPA 5-year employment practice that restricts staff tenure. This would incentivize achieving success in a limited time and help to prevent the establishment of entrenched bureaucratic thinking.

On the industrial side Congress should consider a new National Defense Education Act with a goal of training a new generation of scientists, engineers, welders, and factory workers that can support the DIB.

Coordinate Geo-economic Tools of Warfare: There is a need to re-evaluate the current tools of economic warfare which are fragmented as authorities, responsibilities and programs are dispersed across the government. DOD at a minimum needs stand up a high-ranking advisor to the Secretary to coordinate what is happening in the interagency and devise a cohesive economic warfare strategy. These current tools include industry standards, export controls, sanctions, overseas capital investment, foreign aid (military and civilian), internal direct foreign investment (CFIUS), market intervention and domestic source restrictions, antitrust, financial clearance and money transfer, and tariff policy.

Leverage Allied Cooperation: How our Allies fit in is a major source of our comparative advantage over China. We must use it. We have a strong set of alliance partners who hopefully have been jolted out of their complacency and have come to the realization that they could be the next victim of Russian, Chinese, North Korean or Iranian aggression either directly or through proxies.

The US has many of the best export versions of military technology in the world, at least for now. It has given up markets in the past such as for drones, night vision, and space systems due to stringent export control processes under ITAR. The Foreign Military Sales (FMS) government-to-government sales process and Direct Commercial Sales (DCS) export processes suffer from similar linear, step-by-step, bureaucratic hurdles that would be familiar to the defense acquisition process. These processes take too long and purchasing countries increasingly have other alternatives to go to.

The selling of arms is a foreign policy decision but is also increasingly disconnected from the realities of the industrial base's ability to increase production. FMS customers after navigating the tricky path of approval then have to wait in line for years to actually see something delivered to their doorstep. The US arms sales process can't be based on empty promises for equipment that will likely never be delivered given production backlogs and timelines. Congress should look to create an inventory of exportable weapon systems that could be tapped in cases where systems are needed urgently, as in Ukraine, without having to tap into US stockpiles.

As defense technology progresses in foreign countries, it will be more important for real collaboration and cooperation to occur between the US and its closest allies rather than just a direct sale or transfer of US systems. Congress should look to (at least for the AUKUS, Five Eyes, or NTIB nations) a means of harmonizing requirements for systems transferred under FMS and DCS/ITAR and exempt these nations from ITAR controls to enable cooperative development and production of defense systems. We should identify which countries use similar or the same systems and purchase platforms and parts from them to build up supply. We should consider co-production in shipbuilding with the leading commercial shipbuilders in Japan and South Korea while looking to leverage other allied capabilities. AUKUS offers the opportunity to co-produce in Australia GMLRs, 155mm, JDAMs and other widely used munitions that are standard with allies. Just as in acquisition, US security and technology control policies were built around an era of US defense technological dominance that has long passed and these policies and processes now serve as barriers to innovation through working and cooperating with our closest allies.

Conclusion: It is now time to act and take measures to improve the defense industrial base and build a new Arsenal of Democracy. Time to capability and CMI needs to be restored and an emergency 1-2- and 3-5-year effort is required to rebuild our industrial deterrence to avoid a war with China. Peace comes through strength and that strength at its foundation begins with our industrial base. Thank you for the opportunity to testify.