A 21ST CENTURY DEFENSE INDUSTRIAL STRATEGY FOR AMERICA

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In many ways, Americans have every reason to be confident about our national security future.

The American military is still the most powerful in the world. Its leading defense industry companies are still global leaders in weapons innovation and production. Likewise, the Department of Defense is still the colossus of the federal system, i.e., the single biggest buyer of goods in the US government. But unless the industrial and manufacturing base that develops and builds those goods modernizes and adjusts to the world’s new geopolitical and economic realities, America will face a growing and likely permanent national security deficit.

America’s defense industrial base was once the wonder of the free world, constituting a so-called “military-industrial complex” that, regardless of criticism, was the model for, and envy of, every other country—and the mainstay of peace and freedom for two generations after World War II. Today, however, that base faces problems that necessitate continued and accelerated national focus over the coming decade, and that cannot be solved by assuming that advanced technologies like autonomous systems, artificial intelligence (AI), 5G, and quantum will wave those challenges away, and magically preserve American leadership.

On the contrary, those advanced technologies themselves rely on a manufacturing complex whose capability and...
What will be required is a defense industrial strategy based on a four-part program to:

1. Reshore our defense industrial base and supply chains to the United States and to allies, starting with microelectronics, and restore our shipbuilding base.

2. Build a modern manufacturing and engineering workforce and research and development (R&D) base.

3. Continue to modernize the defense acquisition process to fit 21st century realities.

4. Find new ways to partner private sector innovation with public sector resources and demand.

All these steps will be necessary to create a robust, resilient, secure, and innovative industrial base. The defense industrial base is a key to preserving and extending US competitive military dominance in the coming century and, with it, deterrence that will keep Americans safe and keep the peace. Realizing a defense industrial strategy will require a substantial commitment of capital investment and resources, as well as continuing and extending the reforms to the Defense Department’s industrial base that have been underway in the past several years.

capacity will have to be trusted and secure to protect the Pentagon’s most vital supply chains. These include microelectronics, space, cyber, nuclear, and hypersonics, as well as the more conventional technologies that make up our legacy defense equipment.

Photo Caption: A scientist manufactures lithium ion batteries in a battery research facility. (Getty Images)
2. THE FOUR EVOLUTIONS OF THE DEFENSE INDUSTRIAL BASE

The issues confronting our defense industrial base can be viewed in the context of four major evolutions stretching over more than a half century, each of which requires us to accelerate change and reform.

The Deindustrialization of the United States
The first has been the steady deindustrialization of the United States over the past five decades, including workforce and manufacturing innovation. From 40 percent of the US gross domestic product (GDP) in the 1960s, manufacturing has shrunk to less than 12 percent today, while shedding more than five million manufacturing jobs from 2000 to 2015 alone. Just 50 years ago, manufacturing industries employed 36 percent of male workers. Today, manufacturing employs fewer than 11 percent of all workers.\(^1\) While total manufacturing output has grown during this period, thanks in part to labor-saving technologies, the workforce on which a defense industrial renaissance would depend has become, in effect, an endangered species.

Together, a US business climate that has favored short-term shareholder earnings (versus long-term capital investment), deindustrialization, and an abstract, radical vision of “free trade,” without fair trade enforcement, have severely damaged America’s ability to arm itself today and in the future. Our national responses—off-shoring and out-sourcing—have
been inadequate and ultimately self-defeating, especially with respect to the defense industrial base.

These trends have had particular impact on the core element of a successful manufacturing economy: the machine tool industry. Of the world’s top 21 machine-tool makers, only 2 today are American: Gleason and Haas Automation. By contrast, eight are based in Japan, and six in Germany. And while its domestic machine tool sector remains nascent, China has emerged as a major machine tool customer. Machine tools laid the groundwork for the mobilization miracle of World War II, a fact understood by friends and foes alike, while America has allowed its machine tool sector to turn from a national asset into a national security vulnerability.

The Cold War’s End and the Defense Industrial Base’s Contraction

The second development was the end of the Cold War, which was seen by many to render obsolete the assumptions and requirements that drove a legacy defense industrial base aimed at defeating a peer competitor, the Soviet Union, i.e., producing weapons that would counteract the Soviet advantage in quantity in conventional arms. This included building a massive nuclear arsenal, and later innovations such as stealth, precision guided munitions, and the multiple independent re-entry vehicle (MIRV).

The collapse of the Soviet Union and the end of Cold War tensions and priorities should have brought an intense rethinking of the Department of Defense’s needs, including fundamental changes to the structure of its industrial base. One change that did take place was the drastic consolidation of the largest defense contractors from fifteen to five, which, among other things, reduced competition for contracts, formerly a key driver behind controlling costs and spurring innovation.2

The War on Terrorism, with its focus on disrupting terrorist cells and havens, and counterinsurgency and stability
operations delayed by a crucial decade and a half the adjustment to new geopolitical and military realities, including the steady rise of an aggressive and militant China and an unreconciled Russia.

The Advent of High-Tech and Advanced Digital Technology

The third evolution has been the advent of high-tech and advanced digital technology, from personal computers, cell phones, and solid-state sensors to the internet and 5G wireless technology along with artificial intelligence (AI) and quantum computing. These technologies are and will continue to be the driving forces of the United States and global economy, and will also determine the military balance of the future—while at the same time opening up critical security threats in peacetime, through cyber and intellectual property theft and information warfare, not to mention future scenarios involving quantum computer attacks on critical civilian and defense infrastructure.

Moreover, these technologies pose new problems for defense contractors and for the Pentagon in securing a trusted supply chain for critical items such as processed rare earth elements and microelectronics, where gaps and unanticipated interruptions can be triggered by the loss of a sole supplier for purely economic reasons, or by a Chinese trade embargo or military action. Events of either type can jeopardize a sustainable industrial base.

Pentagon leaders recognized that this technological revolution would require a major shift in the military’s basic requirements for warfighting, but also would demand building relations with an industrial base quite different from the one that had supplied its equipment needs for decades, i.e., with newer companies such as Google, Oracle, and many other Silicon Valley firms. To facilitate this shift, the Department of Defense launched the Third Offset strategy, using, in the words of one thoughtful DoD official, “combinations of technology, operational concepts, and organizational constructs—different ways of organizing our forces, to maintain our ability to project combat power into any area at the time and place of our own choosing.”

However, the Pentagon’s Third Offset did not evolve into a robust strategic doctrine. Meanwhile, the military services took an understandable and narrower approach, generally pursuing advanced technologies to fit their individual operational needs. This meant the opportunity for a more extensive systematic rethinking and reordering of DoD’s industrial base was at a minimum delayed. In recent years, leaders of the defense industrial base have been busy making up for lost ground.

The Rise of the People’s Republic of China

The fourth evolution has been the rise of the People’s Republic of China (PRC) as a dual threat, both military (the
Chinese Navy is now the largest in the world with 350 vessels) and economic, which threatens critical supply chains, and also challenges our export control, foreign investment, and technology transfer policies.

China’s spectacular climb as the world’s second-largest economy is well known, with GDP growing at an average annual rate of 9.45 percent since 1978, and China is now poised to become the world’s biggest economy by 2040. The rise of China’s military spending has also been widely reported, with a twelve-fold increase over the past two decades, jumping from over $20 billion in 1999, to over $250 billion in 2019. China currently spends more on defense than do Japan, South Korea, the Philippines, and Vietnam combined, and is second only to the United States in its military budget. China’s lower costs may mean that its defense spending has purchasing parity with ours.
China's defense spending is augmented by its policy of “military-civil fusion,” which erases barriers between civilian and military sectors to ensure the latest technologies like AI and quantum computing are quickly integrated into security capabilities.

Though the exact amount of China's defense spending is opaque for the most part, the NATO definition of China's military expenditures captures the activities normally associated with defense spending and provides a reasonable benchmark. While China's defense budget is smaller than the US defense budget, it is the vectors of that spending that are most alarming.

One is naval construction. The buildup of China's navy, including aircraft carriers, has been one of the most remarkable and strategically disruptive global defense spending trends in the past two decades. By commissioning fourteen warships a year, Beijing has made clear that it intends to be a world-class maritime power in addition to having the world's largest military on land. While China's naval buildup has been able to piggyback on its rapidly expanding commercial shipbuilding industry, US shipbuilding, by contrast, has become a key vulnerability in the US defense manufacturing base, as we will see.

Two other critical components in China's growing military power have been a huge expansion in its ballistic and anti-ship missile inventory and its nuclear weapons arsenal. Its missile arsenal contains advanced capabilities such as maneuverable anti-ship ballistic missiles, MIRVs, and experimental hypersonic glide vehicles, all designed to target American aircraft carriers and forward air bases—the mainstays of US military power projection in the Indo-Pacific region. In addition to the obvious cost in lives, replacing carriers or other ships, or repairing damaged vessels would severely challenge the most robust shipbuilding base. Attempting to repair or replace forward bases in mid-conflict would be an even more complex challenge.

Nor should we ignore Beijing's on-going activities as the world's most egregious cyber threat and intellectual property (IP) thief. America loses nearly $450 billion on an annual basis to cyber hacking, which originates overwhelmingly from China. This behavior already has severely damaged the Department of Defense and its prime contractors, from stolen plans for major weapons systems such as the F-35, to identity theft from America's defense and security workforce.

The Department of Defense cannot, of course, reverse these global developments by itself. However, it has been devising an industrial strategy that responds to this highly disruptive and rapidly changing environment, and is leading the way to turn these changes to America's advantage.

How will the Department accomplish this? By focusing that strategy on four key categories of action: assessment, investment, protection, and promotion of our defense industrial base, both today and in the future.
In September 2018, the Department of Defense released Assessing and Strengthening the Manufacturing and Defense Industrial Base and Supply Chain Resiliency of the United States, a report in fulfillment of Executive Order 13806. The “13806 report” isolated “five inter-related, but conceptually distinct, macro forces” affecting the US industrial base. These included:

- The decline of the US manufacturing base.
- Budget caps, sequestration, and inconsistent US budgets that sharply reduced resources for the military across the board, particularly investment in the industrial base.
- “Deleterious US government business and procurement practices,” including contracting regulations and constant program changes that drive up cost without necessarily adding effectiveness.
- Industrial policies of nations such as China that provide an unfair comparative economic advantage and predatory trade policies that “degrade the viability, capabilities, and capacity of the US national security innovation base.”
- Diminishing US science, technology, engineering, and mathematics (STEM) education and industrial jobs, both of which have a deleterious effect on the industrial base’s ability to sustain itself and to innovate.
As a result, the study found examples by the dozens where “the vitality and resiliency of the industrial base” had been acutely affected, from aircraft design and cybersecurity to machine tools and materials. Since then, Presidents Trump and Biden and their Secretaries of Defense have taken significant steps to ameliorate vulnerabilities in the industrial base’s critical sectors, as described in this report. But the number of cases, typically three to seven levels from the top of the supply chain, where there is just one—often fragile—supplier is staggering. This represents a significant deterioration from just a decade ago when three-to-five suppliers existed for the same component, let alone several decades ago, when the US military generally enjoyed dozens of suppliers for each such item.

Many US small and mid-size businesses exited the defense field over the last three decades not only because of reduced demand (we build a lot fewer platforms than we once did), but because doing business with the government proved too difficult, with margins too low. Rules that were designed to give good value to taxpayers did not necessarily provide good returns for these firms, often family-owned. They chose instead to employ their entrepreneurial talents and financial resources in the commercial market.

The 13806 report also identified sixteen key industrial sectors, whose risks and vulnerabilities are assessed in more detail below. The core of the department’s industrial base includes government-owned government-operated (GOGO) and government-owned contractor-operated (GOCO) shipyards, depots, arsenals, and ammunition plants. These have been at critical risk for many years thanks to the macro factors identified earlier: the decline of manufacturing and STEM education, the need to rely on single suppliers for many critical components, and a severe erosion of America’s manufacturing workforce.

Our National Security Innovation Base, in the language of the 2017 National Security Strategy, is the “American network of knowledge, capabilities, and people—including academia, National Laboratories, and the private sector—that turns ideas into innovations, transforms discoveries into successful commercial products and companies, and protects and enhances the American way of life.” The strategy continues, the “genius of creative Americans, and the free system that enables them, is critical to American security and prosperity.” We would add, “and to the future of our defense resources and the ability of our military to arm itself effectively today and tomorrow.” Therefore, we have identified three steps to connect the defense industrial base to that US national innovation base.

First is integrating new manufacturing technologies and processes, where a series of DoD programs across the military departments and Office of the Secretary of Defense are useful, indeed critical.

The second is a Department of Defense-wide focus on supporting an industrial base for peer conflict. After a decade and a half of equipping the military for operations in Iraq, Afghanistan, and elsewhere, the Pentagon has been recalibrating to face the challenges posed by China and Russia. While the military services never stopped planning and procuring for high-end combat, the threats posed by adversaries require increased investment and focus on the most advanced capabilities, and on the industrial base to support them.

The third and arguably most difficult is confronting difficult but necessary investment choices, including expanded funding for capital investment in facilities and training and maintaining the workforce. Without that serious and targeted investment—billions instead of millions—America’s defense industrial base is simply unsustainable, let alone capable of supporting our deployed forces and legacy equipment while solving the complex warfighting challenges posed by advanced technologies in the 21st century, from AI and cyber to hypersonics and autonomous air and sea systems.
US Shipbuilding Capacity

America’s shipbuilding woes, both defense and commercial, began more than five decades ago. Fourteen defense-related new ship-construction yards have shuttered, and three have exited the defense industry. Only one new-ship-construction yard has opened. Today, the Navy contracts primarily with seven private new-construction shipyards, owned by four prime contractors, to build its future Battle

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**Figure 3. The US Defense Industrial Base**

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Force, representing significantly less capacity than the leading shipbuilding nations.7

The Future Naval Force Study (FNFS), developed by the Department of Defense to ensure American naval supremacy, set forth a multi-year program divided into 5 year increments with careful attention to meeting base budgetary limitations to achieve the goal of a 355-ship navy. Yet that plan and any new one by the Biden-Harris administration has to rely on a maritime industry, both naval and commercial, that has significantly less capacity than the world’s other leading shipbuilding nations—South Korea, Japan, and, ominously, China.

So while today, the United States Navy’s Battle Force consists of 297 ships, China has managed to build the world’s biggest navy with 350 vessels. China’s shipbuilders also enjoy the advantage of being part of the world’s biggest national steel producer and user. The United States meanwhile is fourth, after China, India, and Japan.

How do we fill the shipbuilding gap? Start by building more ships. Not only will that expand the fleet, it will drive the analysis and decisions required to ensure a shipbuilding base that can produce and sustain an expanded Navy. That our shipbuilders delivered in 2020 no fewer than ten ships (two Virginia-class submarines, one America-class amphibious assault ship, three littoral combat ships, two Spearhead-class expeditionary fast transports, one Arleigh Burke-class destroyer, and one Lewis B Puller-class expeditionary sea base) is a remarkable achievement. It is a harbinger of what can be done with even a modest expansion of that capacity.

Alexis de Tocqueville noted in 1832 that Americans “are born to rule the seas.” In the final analysis, reaching our nation’s minimum naval goals will demand substantial investment in refurbishing old yards and establishing new ones, and partnering more with trusted allies who want to invest in the US shipbuilding base. More broadly, a renewed commitment to reinforcing America’s place as the world’s leading maritime nation will, as it always has, lead to jobs, workers with skills that will be useful to a variety of other domains such as electric transportation and next-generation energy storage and batteries that loom large in America’s future.

Software Engineering and Acquisition
Another area of concern, but also an example of recent progress, is software engineering. Software acquisition remains one of the most expensive and most complex sectors in the DoD. For example, the F-35 Joint Strike Fighter has required more than eight million lines of code, almost all of which had to be written by its prime contractor and sub-contractors, virtually from scratch and, then again, after Chinese cyber theft. All software “blocks”—the systems designed to take the plane from testing to full production—experienced serious production and budgetary delays. These, in turn, contributed to expanding the Lightning II’s total price tag.

One could argue that today’s defense systems are no more or less than physical platforms for software, yet developing and buying that software had become a major bottleneck.
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https://media.defense.gov/2021/Jan/14/2002565328/-1/-1/0/21ST-CENTURY-IND-STRAT-INFOGRAPHIC-FOREWORD.PDF
Standard Pentagon programming was not designed to deal with software, so crucial to operating systems large and small, including networked warfare. The Department of Defense has traditionally acquired IT and software-based systems in the way it bought aircraft carriers—as if they were physical items to be forged or welded or mass-produced. The standard acquisition cycle has been geared around multiyear milestones and intensive evaluation reviews that can take months or years. The modern software development cycle, by contrast, moves in weeks, days, and even hours and seconds—because software is a digital item, subject to real-time improvement and innovation, whose only limits are the human imagination and the speed of an electron. To take one example, given the unique iterative dynamic of software development, the Pentagon’s traditional serial approach to “the color of money”—different budget accounts for development, production, and sustainment—was a major obstacle.

The Department of Defense Innovation Board and Defense Science Board dug into this problem and other challenges with software development and acquisition. Based on their findings, the Office of Secretary of Defense for Acquisition & Sustainment issued in October 2020 a ground-breaking new direction: the Software Acquisition Pathway. Next steps will involve the Congress and the Services to pilot the creation of “software colored money” as an imperative.

Fixing software acquisition was part of a larger process of changing another key vulnerability, namely, how an outdated and sclerotic acquisition system, layered since the 1960s, has hampered the industrial sector.
Ultimately, the most important asset our defense industrial base possesses isn’t machines or facilities, but people. America needs an ambitious effort, like the Eisenhower National Defense Education Act, to support education and training for manufacturing skills required to meet DoD and wider US requirements. As the 2020 DoD Industrial Capabilities Report notes, while China has four times the US population, it has eight times as many STEM grads, while Russia has almost four times more engineers than the United States. We have lost ground also in many equally important touch labor industrial skills sets.

A skilled workforce is especially critical in a defense-focused industrial strategy, which requires innovative and daring solutions, and production and integration of extremely complex systems. Here the OSD Industrial Base Assessment & Sustainment (IBAS) capability plays a crucial role. It is finding ways to close the gap, including programs for training and incentivizing a new manufacturing workforce. It is preparing the
way for new affordable manufacturing of defense systems and reducing the risk of over-extended supply chains and chronically low inventories.

Unfortunately, the budget allotted for IBAS, which has ranged from $10-95 million, is empirically inadequate for the job to be done. A budget of $1 billion would enable the program to expand, by a vast number, employment in the US production sectors. The current mismatch between mission and means hampers the ability to focus solutions on the right problems across industrial sectors, and grow large numbers of highly-skilled, well-paying American jobs.

This issue is one that should be confronted more broadly, under the headings of investment, protection and promotion.

**Investment**

The mismatch between the demonstrable national requirement and the inadequate resources available calls for presidential and congressional action to avoid a series of catastrophic vulnerabilities in critical sectors of the defense industrial base. Fortunately, there are new paradigms available for public-private partnering to accomplish these ends, including creating a flexible manufacturing workforce that would be available for rapid mobilization of the defense industrial base in the event of a major conflict. We will take time here to point out two of them.

The first is in the area of semiconductors and microelectronics. Microelectronics are critical to producing and maintaining existing military systems, for advancing emerging technologies like AI, 5G, and quantum computing, and for sustaining critical infrastructure and indeed, our entire modern economy, including the emerging electric vehicle revolution. Microelectronics are in nearly everything, including the most complex weapons the Department of Defense buys, such as Aegis warships, the F-35 joint strike fighter, soldier systems, and our nuclear weapons and their command-and-control—which together form the backbone of our national defense.

Thirty years ago, more than one-third of all microchips produced worldwide came out of the American companies that gave Silicon Valley its name (silicon being the key ingredient in manufacturing microchips containing millions of microscopic transistors). Today that number has slipped to only 12 percent, with most production in Asia. China aims to dominate global semiconductor production, and in the meantime, current suppliers in Taiwan, South Korea, Malaysia, and elsewhere are in easy range of Chinese missiles, subversion, or air or maritime interference.

Thus, in addition to its growing dominance in the area of production, Beijing is already in a position, through its geographic and political position, to threaten virtually our entire supply chain through theft, corruption of microelectronic products, disruption of supply, coercion, and other measures even short of military action. This leaves American deterrence and critical warfighting capabilities—not to mention our automotive and nearly every other US industry—at the mercy of our main strategic competitor.

The Boston Consulting Group and the Semiconductor Industry Association recently issued a report calling for public-private funding of up to nineteen new semiconductor manufacturing facilities (or fabs) in the continental United States over the next decade. The report estimates that this will require at least a $50 billion federal investment in addition to industry’s share. However, it also forecasts that the initiative will create more than 70,000 high-paying jobs and would position the United States to capture a quarter of the world’s growing chip production.

The cost of a new fab today is roughly $10-30 billion, which is far more capital investment than even America’s biggest semiconductor companies can afford if they are to produce chips that are price-competitive—that is, that Americans and other customers will buy. Chip manufacturing equipment is hugely expensive and has to be replaced with each new wave of innovation.
Outside of the United States, foreign governments and their citizens pay the lion’s share, one way or another, of the cost of building the fab. The companies do not. They take on the other massive set of costs: running the fab. The hard truth is that if the United States does not start doing the same to level the field, our nation will continue to see its historically low share of chip production continue to decline to irrelevance. We will have few new fabs. We will have fewer semiconductor production jobs. We will have frightening vulnerability to foreign cut-offs whose impact would make our COVID-related shortages look miniscule.

A recent success story is the 2020 Columbus Day ribbon-cutting for the new Skywater Technology Foundry in Bloomington, Minnesota—the first new semiconductor fab to open in the United States in a generation. A combination of Defense Department investment in facilities and research and development and private equity capital to streamline operations is producing integrated circuits for the automotive, computing and cloud, consumer, industrial, and medical sectors, and radiation-hardened microelectronics that are vital for the military’s use of outer-space.

Congress’s 2020 bipartisan passage of the landmark semiconductors legislation, known as the CHIPS act, opens vistas for future creative pooling of federal and private capital to fund fabs in the United States. President Biden and Congress are weighing putting a $50 billion appropriation behind the act. A hugely successful model of how to leverage such funds into a multiple is the Taiwanese approach, which catapulted the island in just several decades into the leading producer of microelectronics in the world.

Hypersonics development and nuclear weapons sustainment are other areas quickly approaching a tipping point in terms of investment. Facilities—including unique production equipment and in many cases the necessary workforce—require reconstitution, major modernization, and increases in capacity. Test ranges and instrumentation need significant capacity increases and modernization. Investment in both industry and Defense Department facilities is necessary to achieve the required capability and capacity.

Finally, it is also worthwhile to take a hard look at the overall research and development (R&D) picture. The United States continues to lead the world in gross domestic spending on R&D, although China is rapidly and consistently closing the gap. Nonetheless, aerospace and defense companies are among the lowest R&D spenders compared to other critical sectors. America’s six biggest defense contractors have spent on average 2.5 percent of their sales on R&D each year. This compares to 10 percent of sales for “big tech” firms like Facebook, Amazon, and Google. So, while defense companies’ R&D spending increased from 2014 to 2019, and while aerospace firms in general spend more than pure defense firms, R&D spending per firm would have to increase by 50-60 percent to keep pace with other domestic technology leaders. It remains for lawmakers and the Department to find ways to incentivize internal research and development (IRAD) so that our leading defense companies expand their engines of innovation and technological breakthroughs.

Photo caption: A building model sits inside a 3D-printer after it was completed at ABC Imaging in Washington, DC, on August 1, 2018. (Saul Loeb/AFP via Getty Images)
The bottom line is: if we are going to secure the future versus China, then far more investment is going to be required both by Federal authorities and the private sector. That includes funding to ensure that research, development, and resulting products are safe and secure from adversary influence and manipulation.

Protection

One of the most important developments in the past several years has been how the White House, the Defense and other Cabinet departments, and Congress have worked together to limit adversarial foreign investment into and technology transfer out of our defense industrial base—especially from and to China.

A landmark achievement was the bipartisan passage of the Cornyn-Feinstein sponsored Foreign Investment Risk Review Modernization Act (FIRRMA), which the Trump administration welcomed and executed with vigor. It updated the interagency Committee on Foreign Investment in the United States (CFIUS) to restrict investment by adversaries, including China, in US companies and the economy. New rules were also put in place to limit allies’ reliance on Chinese technology and industry when purchasing American defense-related goods.

The DoD Directorate for Foreign Investment Review is marshalling the information and insight of more than thirty Department of Defense components to contribute to the effort by US national security and financial authorities to halt dangerous Chinese acquisition of hard-earned American economic crown jewels and the private personal data of ordinary Americans.

Foreign investment is welcome, especially from allies and friends. That is why the Pentagon has encouraged participation in the National Technology & Industrial Base (NTIB) by allies such the U.K., Australia, and Canada, and why steps should be considered to expand our base of trusted partners, when they are willing to take the steps necessary to strengthen their foreign investment screening and defense industrial security rules.

Of course, and as evidenced by extensive reporting on Chinese and Russian cyberattacks, the same protections need to be implemented within the Department of Defense and its contractor base to protect our industrial assets from foreign cyberattacks and cyber theft. Preserving the US overmatch in defense technology inside cyberspace is an explicit objective of the national cyber strategy, including ramping up offensive, defensive, and cybersecurity capabilities. The on-going effort to protect the industrial base also meshes with the recently established DoD Cybersecurity Maturity Model Certification (CMMC) program, with its five levels of new cybersecurity standards for all DoD contractors.

But there are also important vulnerabilities concerning major defense platforms that deserve to be addressed as part of progress on industrial base reform.

Promotion

The hard truth is, in a globalized economy, America cannot solve its defense industrial problems (or indeed many of our other industrial challenges) solely by itself. The days when our military could arm itself effectively by relying entirely on its domestic manufacturing base, as it did during World War II and the Cold War, are long gone. Instead, a long-term strategy of reshoring defense manufacturing must balance and mitigate the risks of relying on other countries as supply chain partners, in particular, countries that are allied or friendly with the United States but also have economic and/or technological ties to China, or are simply vulnerable to Chinese coercion, disruption, pressure, or military action. Another side of the reshoring imperative is crafting an effective export policy for the US and its allies that protects national security while not hampering innovation or key scientific advances—while also promoting the idea that the safest course always is having American companies manufacturing defense goods, right here in America.

With both these points in mind, we counsel a focused high-level US diplomatic initiative to draw in reliable international
partners to become part of a trusted industrial base and supply chain. This effort might be dubbed “strategic reshoring,” which includes expanding the reach of mechanisms like the NTIB and the US-India Defense Technology & Trade Initiative (DTTI), as well as the new DoD Trusted Capital Program to facilitate capital investment into the industrial base from safe foreign and domestic sources.

The promotion of partnerships is not just limited to foreign partners. For example, the OSD Office of Small Business Programs has been expanding the opportunities for small and medium-sized firms across the fifty states to participate in creating a new reshored American industrial base.

It would also be a mistake to overlook how the Department of Defense can be a leader in promoting innovation in America’s industrial and manufacturing base. Here a flagship program can emerge from the Manufacturing Technology program in the Office of the Secretary of Defense, whose nine institutes showcase how the Pentagon’s own manufacturing techniques and innovations can lead not just its own industrial base but American industry as a whole.

Created in 1956, Manufacturing Technology is comprised of component investment programs operated out of the Office of the Secretary of Defense, Army, Navy, Air Force, Defense Logistics Agency, and Missile Defense Agency. Its nine manufacturing innovation institutes are public-private partnerships designed to overcome the challenges faced by manufacturing innovators in various technology areas, from light manufacturing to composite materials and biotechnology. To date, the DoD has invested $1.2 billion in the Manufacturing Technology Institutes, with $1.93 billion in matching funds from industry, state governments, and academia. To become a truly global leader in manufacturing innovation, a two- to three-fold increase in the innovation budget by the Congress is warranted.

Finally, officials need to demonstrate how advancing and modernizing the defense industrial base is vital to keeping costs down and innovation up for present and future military readiness as the US prepares its armed forces in the 21st century. This will be especially true of naval and maritime forces, where reviving US shipyards and launching new initiatives for manufacturing advanced systems for sea control, such as unmanned and robotic systems, will be a hinge for strategic success. But the same applies to air and land defense assets, where making acquisition cost-effective as well as timely will depend on the strength and health of our defense industrial base.

In short, following through on promoting a strong and resilient industrial base can point the way to streamlining the Department of Defense’s acquisition process and defense systems’ life cycle, which not only saves money but makes our men and women in uniform safer and more effective—while securing our national security future.
In conclusion, our defense industrial base has reached an inflection point in its history regarding the balance between its vulnerabilities and its opportunities for modernization and reform. Some might say restoring our defense industrial and manufacturing base dominance will require nothing less than a miracle. The truth is, the United States and its military organizations have performed similar “miracles” before: the resolve to see that miracle through is deeply steeped in our history as a nation. Ambitious policies like these require an ability and willingness to make strategic decisions, for example, recognizing that what may have worked in the past is no longer working and will not work in the future. The consensus is growing, across political lines, on the need to reshore critical industries, create American jobs, and counter the challenges of China.

In fact, the requirement that the federal government guide and direct the nation's industrial future, including its defense needs, is

Photo Caption: A researcher displays a silicon wafer, an essential material used in the production of semiconductors and other technologies critical to US national security. (Getty Images)
part and parcel of the American tradition. In his ground-breaking Report on Manufactures published in 1791, Secretary of the Treasury Alexander Hamilton urged Congress to promote what we would call America’s industrial base so that the United States could be “independent on foreign nations for military and other essential supplies.” In addition to safeguarding national independence, support for manufacturing incentives for emerging industries would level the playing field in the global markets of the day.

Virtually every US president from Hamilton's day until the start of the last decade of the twentieth century understood that sensible and targeted trade measures—anti-dumping fees, countervailing duties, and even modest tariffs to level an unfair playing field—formed the principal tool by which America fostered its industrial base. The 1990s saw an experiment in radical trade policies—dropping reciprocity—that made earlier presidents, such as FDR, Eisenhower, and JFK, all advocates of free trade, look, with their prudent tariffs, like protectionists.

The industrial base enabled our War and Navy Departments to execute the first of these defense production miracles during World War II when our military had to move from a virtual standing start (the US Army ranked nineteenth in the world in 1939) to becoming the most powerful military and industrial base in the world in less than three years.

A similar pivot took place during the Eisenhower administration in the 1950s, when the Cold War forced the Department of Defense to re-engineer its concept of how to achieve victory over a conventionally-armed Soviet Union, with a bold shift of resources from World War II-era strategic doctrines to nuclear deterrence and ballistic missiles. This strategic rebalance resulted in a corresponding shift in America’s defense industrial and scientific-technological base, the First Offset.

With the Second Offset in the 1970s and 1980s, the Department of Defense learned how to incorporate new technologies including GPS, networked computers, and stealth technology into a bold strategic vision and capabilities that made our warfighters more powerful and lethal, yet also safer and more secure. That transformation also led to a corresponding shift in supply chains, especially a new reliance on emerging commercial off-the-shelf technologies and companies as well as the traditional defense contractor base.

Later came the Third Offset as a way to integrate the latest advanced technologies, including cyber and autonomous systems and artificial intelligence, into a military that would have to be ready to deal with rising Russian and Chinese challenges. What we have learned in the past few years is that such an offset will not take place without conscious, difficult decisions and investments to repair and modernize our defense industrial base, including the need for a larger reshoring of American manufacturing as a whole.
Fortunately, as noted above, a broad consensus is emerging in our political leadership and the American public as a whole on the need both to reshore our manufacturing and to deal boldly with the global threat of China.

The reshoring imperative has received an additional impetus from the COVID-19 pandemic, which demonstrated the hazards of relying on other, especially adversarial nations for critical materials and medical equipment. The US Government successfully ramped up production of vital medical supplies, most notably vaccines, as well as ventilators, personal protection equipment (PPE’s), and other products under Title III of the Defense Production Act and the Coronavirus Aid, Relief, & Economic Security (CARES) Act. This initiative relied on the World War II industrial mobilization model described in Arthur Herman’s Freedom’s Forge: How American Business Produced Victory in World War II and James Lacey’s The Washington War: FDR’s Inner Circle and the Politics of Power That Won World War II. The same model in Operation Warp Speed has produced coronavirus vaccines—in what can only be described as a medical research, development, and manufacturing miracle.

All these examples prove that federal resources and direction combined with the private sector’s unique manufacturing and industrial ingenuity can respond to a national crisis, especially when the objectives are well-defined and funds effectively deployed. The Department of Defense, the President, and the Congress can—and must—join to reduce America’s vulnerabilities, increase its security, and provide the resources for an industrial renaissance that will lift up the economic prospects and dignity of millions of ordinary Americans.

Today we see more clearly than ever what America must do to restore and sustain its vital defense industrial base. The elements for a comprehensive defense industrial strategy are all in place. Now comes the hard work of making a robust, resilient, and innovative industrial base a reality—for our women and men in uniform in the 21st century and for all Americans.
ENDNOTES


2. An evolution often described as the “Last Supper,” after the Pentagon dinner where Secretary Les Aspin and his deputy (and eventual successor) William Perry urged greater consolidation of the already-shrinking post-Cold War defense industry.


