



NATIONAL STRATEGY for CRITICAL AND EMERGING TECHNOLOGIES

OCTOBER 2020



WORLD LEADER OF CRITICAL AND EMERGING TECHNOLOGIES

TECHNOLOGY LEADER

TECHNOLOGY PEER

TECHNOLOGY RISK
MANAGEMENT

PILLAR I PROMOTE THE NATIONAL SECURITY INNOVATION BASE

- Develop the highest-quality science and technology (S&T) workforce in the world
- Attract and retain inventors and innovators
- Leverage private capital and expertise to build and innovate
- Rapidly field inventions and innovations
- Reduce burdensome regulations, policies, and bureaucratic processes that inhibit innovation and industry growth
- Lead the development of worldwide technology norms, standards, and governance models that reflect democratic values and interests
- Support the development of a robust National Security Innovation Base (NSIB), to include academic institutions, laboratories, supporting infrastructure, venture funding, supporting businesses, and industry
- Increase priority of research and development (R&D) in developing United States Government budgets
- Develop and adopt advanced technology applications within government and improve the desirability of the government as a customer of the private sector
- Encourage public-private partnerships
- Build strong and lasting technology partnerships with like-minded allies and partners and promote democratic values and principles
- With the private sector, create positive messaging to increase public acceptance of critical and emerging technologies (C&ET)
- Encourage state and local governments to adopt similar actions

PILLAR II PROTECT TECHNOLOGY ADVANTAGE

- Ensure that competitors do not use illicit means to acquire United States intellectual property, research, development, or technologies
- Require security design early in the technology development stages, and work with allies and partners to take similar action
- Protect the integrity of the R&D enterprise by fostering research security in academic institutions, laboratories, and industry, while balancing the valuable contributions of foreign researchers
- Ensure appropriate aspects of C&ET are adequately controlled under export laws and regulations, as well as multilateral export regimes
- Engage allies and partners to develop their own processes similar to those executed by CFIUS
- Engage with the private sector to benefit from its understanding of C&ET as well as future strategic vulnerabilities related to C&ET
- Assess worldwide S&T policies, capabilities, and trends, and how they are likely to influence, or undermine, American strategies and programs
- Ensure secure supply chains, and encourage allies and partners to do the same
- Message to key stakeholders the importance of protecting technology advantage and offer practical assistance whenever possible



TABLE OF CONTENTS

INTRODUCTION	1
Unified with a National Strategy	2
 WORLD LEADER OF CRITICAL AND EMERGING TECHNOLOGIES.....	 3
Technology Leader	3
Technology Peer	3
Technology Risk Management.....	4
 PILLARS OF SUCCESS	 5
 PILLAR I: PROMOTE THE NATIONAL SECURITY INNOVATION BASE	 7
Priority Actions.....	7
 PILLAR II: PROTECT TECHNOLOGY ADVANTAGE.....	 9
Priority Actions.....	9
 CONCLUSION	 11
 ANNEX: UNITED STATES GOVERNMENT CRITICAL AND EMERGING TECHNOLOGIES LIST	 A-1



INTRODUCTION

Throughout our history, American achievements and leadership in science and technology (S&T) have been a driving factor for our way of life, prosperity, and security. However, American leadership in S&T faces growing challenges from strategic competitors, who recognize the benefits of S&T and are organizing massive human and capital resources on a national scale to take the lead in areas with long-term consequences.

The National Security Strategy (NSS) lays out a vision for promoting American prosperity; protecting the American people, the homeland, and the American way of life; preserving peace through strength; and advancing American influence in an era of great power competition. It calls for the United States to lead in research, technology, invention, and innovation, referred to here generally as science and technology (S&T), by prioritizing emerging technologies critical to economic growth and security. The NSS also calls for the United States to promote and protect the United States National Security Innovation Base (NSIB), which it defines as 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.

Our market-oriented approach will allow us to prevail against state-directed models that produce waste and disincentivize innovation, but we will also protect ourselves from unfair competition and prevent the use of our technology for authoritarian activities.

The People's Republic of China (PRC) is not only dedicating large amounts of resources in its

pursuit to become the global leader in S&T. It is also targeting sources of United States and allied strength by employing means that include stealing technology, coercing companies to disclose intellectual property, undercutting free and fair markets, failing to provide reciprocal access in research and development (R&D) projects, and promoting authoritarian practices that run counter to democratic values. The Chinese government, in its quest to develop a world-class military by mid-century, is implementing a strategy to divert emerging technologies to military programs, referred to as military-civil fusion (MCF).

Russia views the development of advanced S&T as a national security priority, and is targeting United States technology through the employment of a variety of licit and illicit technology transfer mechanisms to support national-level efforts, including its military and intelligence programs. These actions include using illicit procurement networks, seeking technology transfer through joint ventures with Western companies, and requiring access to source code from technology companies seeking to sell their products in Russia. With fewer resources at its disposal compared to the PRC, Russia is focusing its government-led S&T efforts on military and dual-use technologies, such as artificial intelligence, that

it believes will bring both military and economic advantages. Despite its focus on developing military versus civil applications, Russia recognizes the importance of industrial R&D. Russia plans to develop needed innovative technologies for its future military requirements by enabling its defense industrial base through civil-military integration.

In accordance with the NSS, we will maintain worldwide leadership in critical and emerging technologies (C&ET) by promoting our NSIB and protecting our technological advantage. For the purposes of this strategy, C&ET are defined as those technologies that have been identified and assessed by the National Security Council (NSC) to be critical, or to potentially become critical, to the United States' national security advantage, including military, intelligence, and economic advantages. The current list of C&ET is included in Annex A.

The United States, with its allies and partners who share common open, democratic, and market-oriented values, will continue to lead the world in C&ET. Since C&ET cover a broad range of areas, the United States will maintain clear leadership in the highest priority C&ET areas and invite its allies and partners to join in those efforts. In high-priority C&ET areas, the United States will be a contributing peer with its allies and partners. Finally, in the remaining emerging technology areas, the United States will appropriately manage any risks to national security.

Unified with a National Strategy

The United States Government is unified behind this common National Strategy for C&ET, and will effectively encourage the

private sector to consider and address the national security implications of C&ET. American C&ET leadership is no longer driven mainly by United States Government funding, and C&ET advances are increasingly taking place outside the United States. Private sector spending on R&D has eclipsed United States Government funding since 1980. However, the United States Government can create the necessary conditions for worldwide C&ET leadership. Strategic competitors, such as the PRC and Russia, have adopted deliberate whole-of-government C&ET efforts and are making large and strategic investments to take the lead. As a result, America's lead in certain C&ET sectors is declining. The United States will take meaningful action to reverse this trend.

The United States will proactively lead in C&ET by leveraging its NSIB, and superior economic system. Proactive choices will enable the United States to seize opportunities to shape and optimally benefit from the technological landscape, stay ahead of strategic competitors, and advance democratic values.

The National Strategy for C&ET encourages unity of effort across the United States Government and provides a framework from which deliberate actions will affect multiple technology areas in a coordinated manner. It is not feasible for the United States to lead in all aspects of every technology area, and there is no single technology that will ensure worldwide C&ET leadership. In fact, many technology breakthroughs occur at the intersection of two or more disparate technologies. Therefore, a holistic approach is required to address the growing convergence of technologies for various applications.



WORLD LEADER OF CRITICAL AND EMERGING TECHNOLOGIES

*“America has long led the world
in innovation and technological advancement.
American ingenuity has launched industries, created jobs,
and improved quality of life at home and abroad.”*

PRESIDENT DONALD J. TRUMP | MARCH 2017

This strategy outlines the ways and means by which the United States, with its allies and partners, will continue to be the world leader in C&ET. To accomplish this enduring state, the United States will lead in the highest-priority C&ET areas, be a contributing peer with allies and partners in high-priority areas, and manage risk in the remaining areas.

As the world leader in C&ET, the United States contributes to and benefits from the technology ecosystems of its allies and partners, maintaining United States advantage and upholding a secure, free, and open international order based on democratic values. This coalition will have access to needed C&ET, regardless of where it resides, and will enjoy increased market share, accrue economic benefits, and avoid technological surprise. Cooperation with allies and partners will not only promote a shared technological advantage, it will also prevent strategic competitors from obtaining unfair advantages.

Technology Leader

The United States will lead in the highest-priority technology areas to ensure its national security and economic prosperity. Technology leadership will require forecasting, prioritization due to limited resources, coordination with allies and partners, appropriate investments early in the development cycle, and periodic re-evaluation as technologies mature.

Technology Peer

As leadership is achieved or maintained in the highest-priority technology areas, the United States will remain a technology peer with its allies and partners in other high-priority technology areas. The United States will work with its allies and partners to advance C&ET based on a foundation of mutual benefit, teamwork, security, and proportional investment. The United States can share its talents and capabilities with allies and partners, and mutually benefit from access to the full

breadth of C&ET available within the trusted community.

Technology Risk Management

Some emerging technologies are globally diffuse or are too early in the R&D phase to have clearly identified implications for

United States national security. In those cases, a risk management approach will be applied to gauge national security implications, inform investments, and monitor development. In managing risk, the United States Government will first identify, evaluate, and prioritize its technology risks, followed by a coordinated response to avoid, reduce, accept, or transfer risk.



PILLARS OF SUCCESS

The United States, with its allies and partners, will continue to be the world leader in C&ET by implementing two necessary pillars of success: **promoting the NSIB**, and **protecting our technology advantage**.

These activities are interrelated and together form the essential actions required to maintain

worldwide C&ET leadership. For maximum benefits, opportunities to promote and protect will be considered in every effort. For example, protecting intellectual property encourages innovation investment, demonstrating how protecting technology advantage can indirectly promote technology development.



P I L L A R I

PROMOTE THE NATIONAL SECURITY INNOVATION BASE

“American thinkers, inventors, and entrepreneurs, empowered by free market capitalism and driven by bold ideas, have created an ecosystem of innovation that is the envy of the world, making our Nation prosperous and strong.”

PRESIDENT DONALD J. TRUMP | OCTOBER 2019

Promoting the NSIB requires a sustained, long-term investment in all aspects of the NSIB, from science, technology, engineering, and mathematics (STEM) education; an advanced technical workforce; and early-stage R&D to innovation-friendly regulations; venture capital; collaboration between government, academia, and the private sector; and working with allies and partners.

Priority Actions

The following actions will be considered or undertaken to promote C&ET development, and are not listed in any particular order:

Develop the highest-quality S&T workforce in the world.

Attract and retain inventors and innovators.

Leverage private capital and expertise to build and innovate.

Rapidly field inventions and innovations.

Reduce burdensome regulations, policies, and bureaucratic processes that inhibit innovation and industry growth.

Lead the development of worldwide technology norms, standards, and governance models that reflect democratic values and interests.

Support the development of a robust NSIB, to include academic institutions, laboratories, supporting infrastructure, venture funding, supporting businesses, and industry.

Increase priority of R&D in developing United States Government budgets.

Develop and adopt advanced technology applications within government, and improve the desirability of the government as a customer of the private sector.

Encourage public-private partnerships.

Build strong and lasting technology partnerships with like-minded allies and partners, and promote democratic values and principles.

With the private sector, create positive messaging to increase public acceptance of C&ET.

Encourage state and local governments to adopt similar actions.



PILLAR II

PROTECT TECHNOLOGY ADVANTAGE

*“The theft of American prosperity will end.
We’re going to defend our industry and create
a level playing field for the American worker.”*

PRESIDENT DONALD J. TRUMP | MARCH 2017

A second way to maintain and improve American leadership in C&ET is to protect our technology advantage both domestically and in conjunction with like-minded allies and partners.

The United States does not tolerate intellectual property theft, the exploitation of open scientific norms, or economic aggression regarding C&ET. Relationships will be rooted in fairness, reciprocity, and faithful adherence to agreements. Protecting the United States technology advantage includes strengthening rules where gaps exist, enforcing agreements, and working with like-minded allies and partners to ensure our common principles prevail.

Another part of protecting the United States technology advantage is defending our NSIB, which requires domestic and international collaboration between companies, industries, universities, and government agencies. The United States will also stand with allies and partners to oppose attacks on their respective NSIBs.

Priority Actions

The following actions will be considered or undertaken to protect C&ET technology advantage, and are not listed in any particular order:

Ensure that competitors do not use illicit means to acquire United States intellectual property, research, development, or technologies.

Require security design early in the technology development stages, and work with allies and partners to take similar action.

Protect the integrity of the R&D enterprise by fostering research security in academic institutions, laboratories, and industry, while balancing the valuable contributions of foreign researchers.

Ensure appropriate aspects of C&ET are adequately controlled under export laws and regulations, as well as multilateral export regimes.

Engage allies and partners to develop their own processes similar to those executed by the Committee on Foreign Investment in the United States (CFIUS).

Engage with the private sector to benefit from its understanding of C&ET as well as future strategic vulnerabilities related to C&ET.

Assess worldwide S&T policies, capabilities, and trends, and how they are likely to influence, or undermine, American strategies and programs.

Ensure secure supply chains, and encourage allies and partners to do the same.

Message to key stakeholders the importance of protecting technology advantage, and offer practical assistance whenever possible.



CONCLUSION

The National Strategy for C&ET, in accordance with the NSS, unifies the United States Government effort to maintain worldwide C&ET leadership with our allies and partners. The United States will lead in the highest-priority C&ET areas, contribute

as a peer with allies and partners in high-priority C&ET areas, and manage technology risk in other C&ET areas. Worldwide C&ET leadership will be maintained by promoting our NSIB and protecting our technology advantage.

ANNEX

UNITED STATES GOVERNMENT CRITICAL AND EMERGING TECHNOLOGIES LIST

The Critical and Emerging Technologies (C&ET) list reflects the 20 technology areas that United States Government Departments and Agencies identified to the National Security Council staff as priorities for their missions. The list will be reviewed and updated annually via the interagency process coordinated by the National Security Council staff. The technology areas are arranged alphabetically.

Advanced Computing

Advanced Conventional Weapons
Technologies

Advanced Engineering Materials

Advanced Manufacturing

Advanced Sensing

Aero-Engine Technologies

Agricultural Technologies

Artificial Intelligence

Autonomous Systems

Biotechnologies

Chemical, Biological, Radiological, and
Nuclear (CBRN) Mitigation Technologies

Communication and Networking
Technologies

Data Science and Storage

Distributed Ledger Technologies

Energy Technologies

Human-Machine Interfaces

Medical and Public Health Technologies

Quantum Information Science

Semiconductors and Microelectronics

Space Technologies

