

Free Executive Summary

Beyond "Fortress America" National Security Controls on Science and Technology in a Globalized World

Committee on Science, Security, and Prosperity;
Committee on Scientific Communication and National Security; National Research Council

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Summary

The export controls and visa regulations that were crafted to meet conditions the United States faced over five decades ago now quietly undermine our national security and our national economic well-being. The entire system of export controls needs to be restructured and the visa controls on credentialed foreign scientists and engineers should be further streamlined to serve the nation's current economic and security challenges.

During the Cold War, the United States was the international center of scientific knowledge and technology. U.S. national security depended on maintaining the technological superiority of our military forces against the quantitatively superior military forces of the Soviet bloc. To help ensure its superiority, the United States established a system of national security controls to prevent the leakage of military-related goods and technologies, including so-called dual-use technologies that could give military advantages to our adversaries. This system was codified in export, visa, and classification laws and regulations. In addition, the U.S. and our allies forged multilateral controls on the international transfer of militarily sensitive goods and technologies. While far from perfect, this system met the needs of the Cold War reality of a bipolar power struggle with a known and well-characterized enemy.

Today, world conditions are very different. Our adversaries are diffuse; they range from sovereign states to small terrorist cells without state affiliation. There is no longer a consensus in the western alliance about who its adversaries are or how they should be contained. Many of the most important technologies for continued military superiority originate in the commercial sector rather than in the military sector. Furthermore, such technological capabilities increasingly arise from scientific and engineering research taking place around the world, not just in the United States. Today, for example, the United States has lost its dominance in fields such as semi-conductor manufacturing. Several countries now rival the United States in creating a climate that encourages and rewards business and scientific innovation. As economic conditions have improved in China, India, and other countries, many young people who would have come to the United States to study or work in science and technology now opt to stay home for their education or to return to their home country after graduate school in the U. S. All these changes mean that American security and prosperity now depend on maintaining active engagement with worldwide developments in science and technology, and with the global economy.

While the United States remains a world leader in advanced science and technology, it no longer dominates; it is now *among* the leaders. We are increasingly interdependent with the rest of the world. What is the United States doing to reap benefits from its increased interdependence? Instead of promoting engagement, the United States is required by our current system of controls to turn inward. Our visa controls have made it more difficult or less attractive for talented foreign professionals to come and learn what is great about this country, or to stay and help grow the American economy. Our export controls retard both the U.S. and its allies from sharing access to military technology, and handicap American business from competing globally.

In the post-9/11 world, even if we could accept the costs associated with mistakenly turning away some of the brightest international students or accept the forfeit of some business growth opportunities in the interest of national and homeland security, these are not the only outcomes of current policies.

Such policies also weaken relations with allies, reduce the capability and strength of America's defense industrial base, and help to create foreign competitors that diminish U.S. market share in critical technologies.

These unintended consequences arise from policies that were crafted for an earlier era. In the name of maintaining superiority, the United States now runs the risk of becoming less competitive and less prosperous; we run the risk of actually weakening our national security. The Cold War mentality of "Fortress America" cripples our ability to confront the very real dangers of altered world conditions.

This conclusion is not unique to this report. Several of these ideas have appeared in reports by the National Academies and by others in the wider policy community over the last twenty-five years. Two of the most recent are last year's Academies' report, *Science and Security in a Post 9/11 World* and *The Deemed Export Rule in the Era of Globalization*, a report to the Secretary of Commerce by the members of the Deemed Export Advisory Committee (see Appendices D and E for titles of additional reports and studies). Rather, the uniqueness of this report lies in two areas:

1. Tying together the multiple strands of the problem—the changing requirements of national security from the Cold War era, the impact of economic globalization on the U.S. economy, the impact of the globalization of science and technology on the U.S. economy and on its S&T leadership—into a single narrative that shows the need for new policy.
2. Proposing policy innovation that can be enacted quickly by the new President that will provide needed fixes to U.S. export control policy, even if Congress continues to prove unwilling or unable to deal with this issue; as well as needed improvements to visa policy.

This report provides an account of the costs associated with building walls that hamper our access to global science and technology and that dampen our economic potential. It also makes recommendations for changes to address the task set forth in the committee's charge:

The ad hoc Committee on Science, Security and Prosperity will produce a consensus report on the relationship between scientific and technological advances and national security threats and the global context within which they interact. The report will succinctly survey (1) the changes in scientific and technological advances, interlocking global economies and current geo-political factors since this regulatory system was established; and (2) the problems with the current federal regulatory system related to national security that oversees the conduct of science and technology. The report will review the national security policies and regulations that have an impact on the conduct of science and technology, and make recommendations for fundamental changes. The recommendations may include those pertaining to the reorganization of an agency or the creation of a new institutional entity. The target audience of this report will be the presidential candidates and the Departments of Commerce, Defense and State, as well as the White House.

In carrying out its charge, the committee developed a brief set of findings and recommendations that are listed below and are discussed in detail in the accompanying text.

Findings

Finding 1. Designed for the Cold War when the U.S. had global dominance in most areas of science¹ and technology, the current system of export controls now harms our national and homeland security, as well as our ability to compete economically.

- A. In almost all cases, the technology base that supports our national security also supports the high-technology sector of the civilian economy.
- B. Many controls imposed in the name of national and homeland security do not, in fact, improve national and homeland security.
- C. Many current controls (outside of narrow military niches) aimed at protecting national security, in fact weaken U.S. innovation and competitiveness in global markets, thereby reducing economic prosperity, which is an essential element of U.S. national security.

Finding 2. The system of export controls on the international flow of science, technology, and commerce is fundamentally broken and cannot be fixed by incremental changes below the presidential level.

- A. For most of the last twenty years, the executive and legislative branches of the federal government have failed to come to agreement—either internally or with each other—on dual-use export control policy. This failure has led to unnecessary vulnerabilities in our national security and in our economic competitiveness.
- B. The current list-based systems are unwieldy, slow, difficult to administer rationally, and are overly proscriptive given global developments in science and technology.
- C. The lack of multinational consensus among our allies about export controls further reduces the effectiveness of unilateral U.S. actions.

Finding 3. U.S. national security and economic prosperity depend on full global engagement in science, technology, and commerce.

- A. Highly capable centers of scientific research excellence and industrial innovation have been developed in many foreign countries over the past 20 years; the U.S. maintains scientific leadership in some areas, and it is hotly contested or has been lost in others.
- B. Global information exchange via the Internet, the increased speed of science and technology advancement, and the strategy of “run faster” are all incompatible with our existing systems of regulating the movement of people, ideas, components, and products.

¹ Throughout this report, the term “science” is used to mean the natural sciences, social sciences, and mathematics. The term “technology” refers to the products of engineering.

- C. The best practices that underpin successful competition in research and technology advancement are undermined by government regulation that restricts the flow of information and people participating in fundamental research. These best practices include:
- Freedom of inquiry
 - Freedom to pursue knowledge for its own sake
 - Freedom to collaborate without limitation
 - Pluralistic and meritocratic support of science
 - Freedom to publish
- D. The best scientific talent from outside the U.S. has been and remains critical to the U.S. research and development enterprise. Maintaining access to this talent depends on visa policies that are welcoming to legitimate and qualified students and researchers.

Finding 4. A new system of export controls can be more agile and effective, recognizing that, under current global conditions, risks to national security can be mitigated but not eliminated.

An important caveat attaches to any discussion of changes in the current system of export controls: there is no "risk free" solution. Today's system is not risk-free either; in fact, it is arguably becoming more and more dangerous because the inclination to equate control with safety gives a false sense of security.

Recommendations

The committee structured its recommendations into three areas: reforming the export control process, ensuring scientific and technological competitiveness, and improving the non-immigrant visa system that regulates the entry into the United States of foreign science and engineering students, scholars, and professionals.

In the committee's view, it is important to act immediately, within the boundaries of the President's authority to ameliorate the policy logjam that is the unintended consequence of Congress's inaction over dual-use export controls. The new President needs to make the changes that will stem a serious decline affecting broad areas of the nation's security and economy.

Recommendation 1. The President should restructure the export control process within the federal government so that the balancing of interests can be achieved more efficiently and harm can be prevented to the nation's security and technology base; in addition to promoting U.S. economic competitiveness.

Restructuring the export control process does not involve abandoning all export controls. Rather, the committee recommends that two policy changes and two structural changes be made to retain needed

export controls while shedding the largest obstacles to an efficient system. With these changes implemented in an expedient manner, the United States will stem the loss of technological and economic competitiveness and begin to benefit from carefully targeted and calibrated controls that reflect and meet current challenges that the country faces in protecting both our national security and our economic well-being.

Action Items

- A. Recognize the interdependence of national security and economic competitiveness factors in making export control decisions with respect to individual requests for licenses through a principle-based system.

When the licensing agency applies principles to decisions about export controls, the focus will stay on *why* items should or should not continue to be controlled, rather than on adding to otherwise static lists of controlled items. This kind of governance system can assess each decision in terms of whether an item should be controlled against the governing principles that have been established within the system. Doing so can ensure that the remaining controlled items are relevant to rapidly changing global conditions. It can also help ensure that decisions are made in a timely manner. The following are the principles that the committee recommends:

1. Maintain the value of protecting traditional U.S. national security in export control policy.
2. Recognize that today this value must be balanced against the equally important value of maintaining and enhancing the scientific and technological competitiveness of the United States.
3. Allow openness and engagement to prevail unless a compelling case can be made for restrictions.
4. Articulate a rational basis for each restriction. Restrictions on unclassified technology should be implemented only when:
 - a. The U.S. alone, or the U.S. and cooperating allies, possess technology that leads not only to identifiable military advantage, but to an advantage that is likely to persist for a significant period of time (i.e., the time needed to field a system based on that technology);
 - b. The U.S., or the U.S. acting together with allies, control the technology such that they can prevent it from moving into the hands of possible adversaries;
 - c. The restrictions do not impose costs and inefficiencies that are disproportionate to the restrictions' security benefits; and

- d. Restrictions are re-examined and re-adjusted periodically to ensure they remain appropriate.
 5. Protect the capability to "run faster".
 6. Treat weapons separately – but define them narrowly and precisely.
 7. Recognize the "global public good" nature of health-related technologies.
- B. Apply "sunset" requirements to all items on export control lists that are controlled unilaterally by the U.S., and require findings to be made every 12 months that removing controls on an item would present a substantial risk to national security. No version of the current control system should survive without an effective method for pruning items from the control lists when they no longer serve a significant definable national security interest.
- C. Establish as a new administrative entity a coordinating center for export controls, with responsibilities for coordinating all interfaces with persons or entities seeking export licenses and expediting agency processes with respect to the granting or denial of export licenses.

This small coordinating entity would be responsible for:

- Receiving all applications for export licenses;
- Determining whether the Department of Commerce or the Department of State should handle the license application and dispatch the application to the appropriate agency for a decision;
- Maintaining timetables for decision making on license applications so that applications do not languish;
- Receiving decisions on applications from the designated agencies and distributing these decisions to applicants;
- Receiving appeals of licensing decisions and petitions for review of sunset decisions, and delivering these to the appellate panel (see description below);
- Maintaining timetables for decisions on appeal;
- Receiving decisions on appeals and distributing these decisions to applicants;
- Providing administrative support to the appellate panel (see description below); and
- Monitoring and oversight of the sunset process.

- D. Establish an independent export license appeals panel to hear and decide disputes about whether export licenses are required, whether particular decisions to grant or deny licenses were made properly, and whether sunset requirements have been carried out properly. An independent, neutral decision-making authority is required to break the logjams in the system caused by philosophical differences and varying interpretations of statutory, regulatory, and executive order language. Two kinds of issues can be resolved quickly and effectively using an appellate decision-making panel:
- First, if the agency makes a decision (either requiring or not requiring a license), and a party or a government agency believes the matter was wrongly decided, there is an avenue to resolve these differences.
 - Second, if the agency fails to remove an item or category of items from the control list under the sunset requirement, or does not act at all within the one-year time period for review of each item on the list, an affected party could appeal either to reverse the agency's determination, or to require the agency to act in a timely way to make the necessary determination.

The committee recommends that an independent export license appeals panel be constituted, appointed by the President or the National Security Advisor.² Panel members would serve a five-year term. The panel would be co-located with the coordinating center and would be housed, for administrative purposes, under the same organizational umbrella. Appeals panels such as this one are not "directed" by an administrative authority. This kind of panel acts independently and neutrally to resolve disputes. It has no operational responsibility other than to hear disputes and issue opinions.

The best organizational home for the proposed coordinating center and the export license appeals panel would be within the National Security Council structure, with the coordinating center's director reporting directly to the National Security Adviser. This placement in the White House structure will ensure the coordinating center's independence and will establish its relationship to the President. The coordinating center and the export license appeals panel would not necessarily be co-located with the NSC. This would not be required for an effective exercise of its powers under the Executive Order.

The committee weighed several options before making the recommendation for a new coordinating center and an export license appeals panel and locating them within the NSC. The option to create an interagency group was rejected because experience supports the conclusion that this would devolve into just another debating society and would not constitute a practical means to improve the present

² It is at times difficult to get presidential action on appointments in a timely way, particularly at the beginning of an administration when there are many competing concerns. For that reason, the President's Executive Order would allow 90 days from the date of issuance of the Order for the appointments to be made through the presidential processes, and after that, the appointments would be made by the Chief Judge of the Federal Court of Appeals for the District of Columbia Circuit within 30 days. Replacement judges would be selected in the same way. No Senate confirmation would be required because this is not a "court"; it is an administrative panel assembled by the President to assist agencies in carrying out their responsibilities. This panel makes decisions among competing interests of agencies the same way the National Security Council's staff makes decisions about the competing interests of the Departments of State and Defense.

export control system. The option to use a group made up of private sector members was rejected because that alternative would not be acceptable to the government agencies involved. The option to place this responsibility with the Department of Defense was rejected, because the department, through its management of the Militarily Critical Technologies List, is an important player in the export control regime. Similarly, any placement within any other cabinet-level department involved in licensing would also compromise the independence of the proposed center. The option to place these administrative functions in the Office of Management and Budget was also considered. Although neither the National Security Council nor the Office of Management and Budget is an operational agency, the committee thinks that the NSC provides the better fit, because of its focus on national security and economic policy. In addition, the chain of command would have the coordinating center's director reporting directly to the National Security Advisor. This would not only signify the importance of these issues, in terms of both national security and economic policy, it would also serve as a brake on the director in terms of choosing his or her battles carefully.

Recommendation 2. The President should direct that executive authorities under the Arms Export Control Act and the Export Administration Act be administered to assure the scientific and technological competitiveness of the United States, which is a prerequisite for both national security and economic prosperity.

Action Items

- A. Maintain the Fundamental Research Exemption that protects unclassified research, as provided by National Security Decision Directive 189, and ensure that it is properly implemented.
- B. Create an economic competitiveness exemption that eliminates export controls on dual-use technologies where they, or their functional equivalents, are available without restriction in open markets outside the United States.

Recommendation 3. The President should maintain and enhance access to the reservoir of human talent from foreign sources to strengthen the U.S. science and technology base.

Traditionally, the United States had to worry about science and technology flowing out of the country. In today's conditions, the U.S. must make sure that advanced science and technology will continue to *flow into* the country. For this reason, the U.S. visa regulations as applied to credentialed foreign scientists should ensure that the U.S. has access to the best talent. Science and engineering degree-holders who prefer, after graduation, to work in the U.S. should have ready access to permission for long-term stays. Granting this access for highly trained technical and scientific personnel is an important way of augmenting a critical segment of the workforce. The U.S. cannot protect U.S. jobs by denying entry to foreign professionals; jobs will simply go abroad. It is important for both the national security and economic prosperity to maintain the flow of human talent into the United States.

Action Items

- A. Streamline the visa process for credentialed short-term visitors in science and technology fields.

The committee recommends the President's Executive Order require that a non-immigrant visa applicant who is a graduate student, researcher, or professional in any field of science or technology and whose application is supported by a qualified university, scientific body, or corporation should receive a determination on his or her visa application within 30 days. This will allow access for credentialed academic researchers to work with U.S.-based colleagues and in U.S.-based programs, and will facilitate work done in U.S. science laboratories.

- B. Extend the duration of stay for science and engineering graduates with advanced degrees.

The committee recommends the President's Executive Order provide a one-year automatic visa extension to international students to remain in the United States to seek employment or acceptance into further advanced study on receipt of advanced degrees in science, technology, engineering, mathematics, or other fields of national need at qualified U.S. institutions. If these students are offered jobs by U.S.-based employers and pass security screening measures, they should be provided automatic work permits and expedited residence status. If students are unable to obtain employment within one year, their visas would expire.

- C. Include expert vouching by qualified U.S. scientists in the non-immigrant visa process for well-known scholars and researchers.

The committee recommends that the President's Executive Order allow qualified U.S. scientists, as part of the visa application process, to vouch for the technical credibility and legitimacy of visa applicants who are in the same or in a similar field. A more interactive application review procedure would permit those with expertise in relevant scientific and technology fields (and personal knowledge of the expertise of the individual whose application is being reviewed) to aid consular officials in accurately and efficiently determining the existence of a real security threat.

- D. Institute skills-based preferential processing with respect to visa applications.

The committee recommends that the President's Executive Order institute a new skills-based, preferential processing with respect to visa applications. The visa applications of scientists and engineers should be given priority. Graduate-level education and science and engineering skills should substantially raise an applicant's chances and confer priority in obtaining residence permits and U.S. citizenship.

In Conclusion

As a nation, we cannot, and should not abandon well-conceived efforts to keep dangerous technology and scientific know-how out of the hands of those who would use this knowledge to create weapons of mass destruction and other, equally dangerous military systems. However, these represent a very narrow and limited set of goods, technology, and knowledge. Our former unilateral strategy of containment and isolation of our adversaries is, under current conditions, a self-destructive strategy for obsolescence and declining economic competitiveness. A strategy of international engagement is a path to prosperity that can be coupled with a smarter approach to security using an adaptive system of

government regulation and incentives. The committee recommends the issuance of an Executive Order that implements the recommendations it has outlined as one of the first orders of business in January 2009.

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BEYOND "FORTRESS AMERICA": NATIONAL SECURITY CONTROLS ON SCIENCE AND TECHNOLOGY IN A GLOBALIZED WORLD

Committee on Science, Security and Prosperity

Committee on Scientific Communication and National Security

Development, Security and Cooperation

Policy and Global Affairs

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Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the organizations or agencies that provided support for the project.

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Advisers to the Nation on Science, Engineering, and Medicine

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The **National Research Council** was organized by the National Academy of Sciences in 1916 to associate the broad community of science and technology with the Academy's purposes of furthering knowledge and advising the federal government. Functioning in accordance with general policies determined by the Academy, the Council has become the principal operating agency of both the National Academy of Sciences and the National Academy of Engineering in providing services to the government, the public, and the scientific and engineering communities. The Council is administered jointly by both Academies and the Institute of Medicine. Dr. Ralph J. Cicerone and Dr. Charles M. Vest are chair and vice chair, respectively, of the National Research Council.

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Preface

The national security controls that regulate access to and export of science and technology are broken. As currently structured, many of these controls undermine our national and homeland security and stifle American engagement in the global economy, and in science and technology. Fixing these controls does not mean putting an end to them, but implementing reforms based on the realities of the risks and opportunities of today's threats to the nation.

A growing number of leaders in academia, industry, and government now concur that the system of national security controls needs fundamental change. The National Research Council of the National Academies convened the Committee on Scientific Communication and National Security, a select group of national security officials and leaders from the sciences, the defense industry, the information technology sector, academia, and the legal community (listed in Appendix A), to assess the impact of these controls. Being in agreement on the pervasiveness of the difficulties, they concluded that attempts to modify the existing regulations or to give guidance to the enforcing federal agencies would be insufficient, because the problems were both large and system-wide. They recommended that the National Research Council assemble a committee to conduct a systemic review of the national security controls that oversee scientific and technological research and development.

Subsequently, the National Research Council established the ad hoc Committee on Science, Security and Prosperity (COSSP) to propose policy solutions. Members were selected on the basis of their participation in the creation and implementation of the current system of national security controls, or their expertise in various fields of science, industry, or university administration. Their biographies are listed in Appendix B.

The committee's charge was to produce a report on the relationship between scientific and technological advances and national security threats, and the global context within which they interact. Specifically, the report addresses (1) the changes in scientific and technological advances, interlocking global economies, and current geo-political factors since this regulatory system was established; (2) the problems with the current federal regulatory system related to national security that oversees the conduct of science and technology; and (3) recommendations for making fundamental changes to the system of export and visa controls.

The committee reviewed reports and recommendations from the organizations listed in Appendix D. They also heard from government and private sector experts, and tested proposed policy changes through debate and discussion. The committee also reviewed the extensive collection of the Academies' reports, listed in Appendix E, that have addressed science and security concerns for more than 25 years, beginning with the 1982 report, *Scientific Communication and National Security*, through to the 2007 release of *Science and Security in a Post 9/11 World*.

The committee's findings confirm the urgent need for fundamental policy change to counteract the harm that is being done to national security and economic prosperity by national security controls adopted in the 1960s and 1970s that reflect Cold War-era policies.

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The committee recommends specific provisions for an Executive Order, issued by the President, to govern a revamped set of controls that will promote the United States' scientific and technological competitiveness, while more effectively protecting national and homeland security. The committee recommends decisions at the presidential level, as this will be required to bring bureaucratic coherence to the network of national security rules and regulations that now spans eight agencies of the federal government.

In conclusion, we would like to add a personal note of deep appreciation to the committee members and staff who helped us to come up to speed on the committee's deliberations. Their wide-ranging expertise and commitment to the project made our participation very rewarding.

Brent Scowcroft

John Hennessy

Co-Chair

Co-Chair

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Acknowledgments

This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the National Research Council's Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process. We wish to thank the following individuals for their review of this report: Norman Augustine, Lockheed Martin (Retired); Lewis Branscomb, Harvard University; William Burns, United States Army (Retired); Barry Carter, Georgetown University; David Goldston, Princeton University; Seymour Goodman, Georgia Institute of Technology; John Gordon, United States Air Force (Retired); Maura Harty, International Center for Missing and Exploited Children; Christopher Kessler, U.S. State Department (Retired); Ellen Laipson, Henry L. Stimson Center on Global Security; James McGroddy, IBM (Retired); Michael Moodie, Chemical and Biological Arms Control Institute; Randall Murch, Virginia Polytechnic Institute and State University; Eva Pell, Pennsylvania State University; William Reinsch, National Foreign Trade Council; Scott Silverston, United States Military Academy; John Steinbruner, University of Maryland; and William Webster, Milbank, Tweed, Hadley & McCloy.

Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the conclusions or recommendations, nor did they see the final draft of the report before its release. The review of this report was overseen by Robert Frosch, Harvard University and Granger Morgan, Carnegie Mellon University. Appointed by the National Academies, they were responsible for making certain that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the authoring committee and the institution.

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