

Protecting U.S. Technological Advantage

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Protecting U.S. Technological Advantage

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Consensus Study Report

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Preface

U.S. leadership in technology innovation is central to our nation's interests, including its security, economic prosperity, and quality of life. Our nation has created a science and technology ecosystem that fosters innovation, risk taking, and the discovery of new ideas that lead to new technologies through robust collaborations across and within academia, industry, and government, and our research and development enterprise has attracted the best and brightest scientists, engineers, and entrepreneurs from around the world. The quality and openness of our research enterprise have been the basis of our global leadership in technological innovation, which has brought enormous advantages to our national interests.

The committee's task was to examine and evaluate the need for boundaries or protections on the openness of scientific research and take into account the benefits and drawbacks of technology protection options. Heightened concerns about potential loss of leadership in critically important technology areas have led to increased rhetoric about the need to escalate protection and restrictions for certain technologies, but in an increasingly competitive and technology-dependent world, ensuring and protecting the nation's ability to lead in technological innovation is of critical importance. Given changes in technology and the global, interconnected competitive environment, the committee found that protecting technologies themselves is often ineffective or even counterproductive.

Instead, the committee believes that a fundamental shift is needed—one that moves away from specific technology controls to a risk management approach that focuses on protecting U.S. advantages in technology leadership and development. Strategies are needed for maximizing our advantages, promoting the scale and speed of our research and technology innovation ecosystem, fostering a risk-taking environment, and attracting, retaining, and supporting the most talented science, engineering, and innovation workforce in the world.

The committee also recognizes that new technologies are increasingly being developed on shared platforms. These platforms speed the scope and scale of new technologies, but they also have unique vulnerabilities associated with them. The committee recommends the development of a new multisector,

multiorganizational, multinational approach to both protection and assurance of these platforms.

Legislation passed after the committee finished its deliberations—namely the CHIPS and Science Act—contains provisions that the committee hopes will facilitate its recommendations: expanding the support of the National Institute of Standards and Technology for standards capacity building and recognizing the critical importance of STEM (science, technology, engineering, and mathematics) graduate students and the STEM workforce as a whole.

Collectively, our recommendations are directed at building a healthier, more effective, and more resilient research and development ecosystem.

ACKNOWLEDGMENTS

We are deeply indebted to the hard work of the committee, which reviewed papers; engaged in thoughtful deliberations with speakers from academia, industry, and government; and spent considerable time developing findings and recommendations. Invaluable help was provided by the consultant writer, Steve Olson. The report also benefited from the input of Evan Johnson and his associates, who aided with the preparation of figures in the report. We are grateful for the dedication of the National Academies staff: Gail Cohen, David Dierksheide, Anne-Marie Mazza, Meghan Ange-Stark, and Sophie Billinge. We acknowledge all with deep gratitude.

Patrick Gallagher

Susan M. Gordon

Acknowledgment of Reviewers

This Consensus Study Report was reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise. The purpose of this independent review is to provide candid and critical comments that will assist the National Academies of Sciences, Engineering, and Medicine in making each published report as sound as possible and to ensure that it meets the institutional standards for quality, 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 thank the following individuals for their review of this report: Arthur Bienenstock, Stanford University; Vinton Cerf, Google, LLC; Jennie Hwang, H-Technologies Group, Inc.; Eric Isaacs, Carnegie Institution for Science; Marc Kastner, Massachusetts Institute of Technology; Farrokh Khatibi, Qualcomm; Theodore Sizer, Nokia Bell Labs; Sridhar Tayur, Carnegie Mellon University; Mitchel Wallerstein, Baruch College of the City University of New York; and Michael Wertheimer, The Chertoff Group.

Although the reviewers listed above provided many constructive comments and suggestions, they were not asked to endorse the conclusions or recommendations of this report, nor did they see the final draft before its release. The review of this report was overseen by Eric Kaler, Case Western Reserve University, and Catherine Novelli, Georgetown University. They were responsible for making certain that an independent examination of this report was carried out in accordance with the standards of the National Academies and that all review comments were carefully considered. Responsibility for the final content rests entirely with the authoring committee and the National Academies.

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The National Academies of Sciences, Engineering, and Medicine
500 Fifth Street, NW | Washington, DC 20001

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