Contributions of DOE Weapons Labs and NIST to Semiconductor Technology

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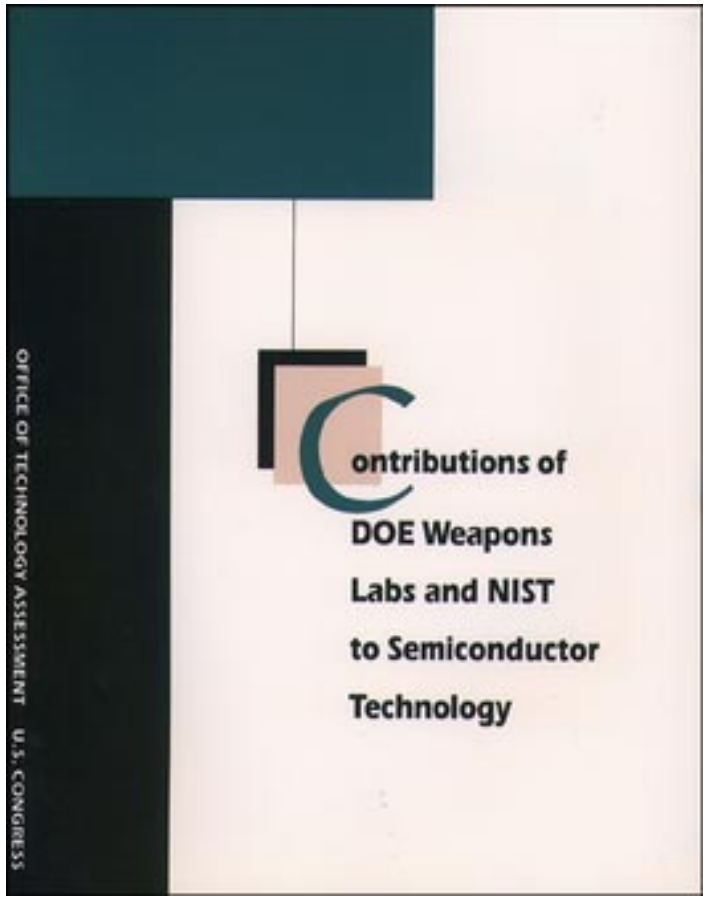

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Foreword

The federal laboratories of the United States are a diverse lot. For those whose primary function was advancing military technologies, the end of the Cold War has meant reexamination of missions, abilities, and resources on a scale grander than anything that has occurred in decades. In particular, the Department of Energy's nuclear weapons laboratories (Lawrence Livermore, Los Alamos, and Sandia National Laboratories) are under close examination. Throughout their existence, the weapons labs' primary missions have involved nuclear weapons. One of the most important is nuclear weapons development, and that function has diminished considerably as a result of the end of the Cold War. While other weapons-related missions remain important, a consensus has emerged that the labs are, in a sense, larger than their remaining missions warrant. But the issue is much larger than simply how much to cut and how to manage the reduction.

National security is still the issue, but defined more broadly than in the past, when it was confined to military security. The concept of national security is now expanding to include industrial competitiveness, and there is lively interest in examining how all the labs in the federal system could contribute to advancing science and precommercial technology. The debate over whether and how to expand the missions of the DOE labs has also raised questions of how to coordinate these new activities with those of labs and agencies that already have responsibility for civilian technology policy—principally the National Institute of Standards and Technology of the Department of Commerce. NIST has emerged in the last few years as one of the federal government's major players in civilian technology advancement through, for example, management of the new and well-regarded Advanced Technology Program.

This Report examines how NIST and DOE weapons laboratories could contribute to advances in semiconductor technology aimed specifically at civilian applications. Semiconductor technology was chosen as an example of a technology focus for a civilian technology initiative, primarily because the industry had already developed a set of comprehensive technology roadmaps and the federal labs had substantial expertise in the area. The Report was requested as a follow-on assessment to OTA's work on the implications for the U.S. civilian economy of the end of the Cold War. That work consists of two Reports: *After the Cold War: Living With Lower Defense Spending,* and *Defense Conversion: Redirecting R&D.* The former considered the effects on defense workers, defense-dependent communities, and defense companies, and suggested policy options to ease transitions for those affected by cutbacks. The latter examined how the R&D institutions whose primary missions were defense-related could contribute to national well-being under a broader concept of national security.

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NOTE: OTA appreciates and is grateful for the valuable assistance and thoughtful critiques provided by the laboratory review panel, The panel does not, however, necessarily approve, disapprove, or endorse this report. OTA assumes full responsibility for the report and the accuracy of its contents.

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