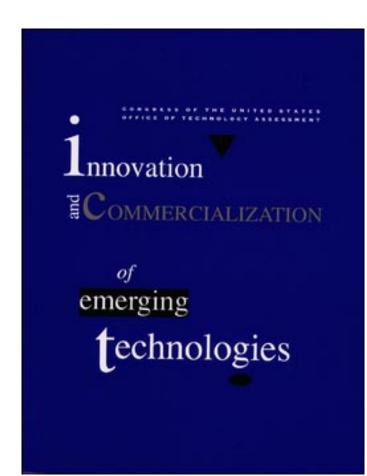
Innovation and Commercialization of Emerging Technologies

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Foreword

echnological innovation is essential to the future well-being of the United States. The ability of the nation to sustain economic growth, increase its standard of living, and improve human health and the environment depends, in many ways, on its success in developing and commercializing new products, processes, and services. The growing capabilities of competitors in Europe, Asia, and elsewhere around the world increasingly challenge the ability of U.S. firms to convert the nation's science and technology base into a competitive advantage. Such concerns have prompted much debate about the proper role of government in encouraging innovation and the commercialization of new technologies. To date, however, the debate has been hampered by an incomplete understanding of the ways in which firms develop and market new products, processes, and services and the barriers they must overcome in the process.

This background paper examines the complexities of innovation and commercialization in an attempt to demonstrate the linkages between science, technology, and innovation, and to highlight the growing importance of factors other than basic research in commercial success. As shown, innovation is a complicated process in which markets often stimulate development of new technologies and product or process development stimulates scientific and technical research. Many factors influence commercial success, including the nature and composition of markets; competition from older technologies; choices of design and implementation; the availability of financing, standards, and complementary assets or infrastructure; and the ability to link with strategic partners. Government exerts significant influence on the innovation process, both intentionally and unintentionally. Research conducted for government missions can benefit commercial industry; federal procurement can jump-start nascent industries; environmental regulations can create markets for new technical approaches; government-sponsored technology demonstrations can provide useful information about new products, processes, and services to both users and developers; and laws in the areas of tax, investment, intellectual property, and antitrust shape the environment in which firms compete for resources and market share.

This background paper was prepared in response to requests from the House Science Committee (formerly the Science, Space, and Technology Committee) and the Senate Commerce, Science, and Transportation Committee. Throughout the course of this study, OTA received valuable assistance from its advisory panel, contractors, and reviewers, who both provided information for the report and ensured its accuracy and balance. The background paper is, however, solely the responsibility of OTA.

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Note: OTA appreciates and is grateful for the valuable assistance and thoughtful critiques provided by the advisory panel members. 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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