Information Technology R&D: Critical Trends and Issues

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Foreword

New computer and communications technologies are obviously transforming American life. They are the basis of many of the changes in our telecommunications system and also a new wave of automation on the farm, in manufacturing and transportation, and in the office. They are changing the form and delivery of government services such as education and the judicial system. Information products and services have become a major and still rapidly growing component of our economy.

A strong U.S. research and development effort has, in the past, been the source of much of this new technology. However, recent events, such as the restructuring of the U.S. telecommunications industry and the emergence of strong foreign competition for some technologies, have changed the environment for R&D. Consequently, the House Committee on Science and Technology, the House Committee on Energy and Commerce, and its Subcommittee on Telecommunications, Consumer Protection, and Finance asked OTA to conduct an assessment of the current state of R&D in these critical areas.

In this report, OTA examines four specific areas of research as case studies: computer architecture, artificial intelligence, fiber optics, and software engineering. It discusses the structure and orientation of some selected foreign programs. Finally, it examines a set of issues that have been raised in the course of the study: manpower, institutional change, the new research organizations that grew out of Bell Laboratories, and implications of trends in overall science and technology policy.

Information technology research and development in the United States is a remarkably adaptable system—important changes may already be taking place in funding patterns, institutional structures, manpower development, and government policies. Hence, the policy issues for Congress are not so much to stimulate change as to remove barriers to productive change, and to monitor and maintain the health of the R&D enterprise in a time of rapid change in an industry so central to our national economy and security.

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