Applications of R&D in the Civil Sector:
The Opportunity Provided by the Federal
Grant and Cooperative Agreement Act of
1977

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The Federal Government now spends about $28 billion per year on research and development (R&D) activities and facilities in the United States. With another $20 billion per year from the private sector, the total national investment in R&D approaches $50 billion annually.

Large though this total is, it portrays only a small portion of the overall impact of R&D on the economy and the quality of life in our society. Research and development is the engine that drives the currents of change in our civilization. From R&D stem the inventions, techniques, and processes that propel innovations through our economic and social systems. Moreover, it has been estimated that, on the average, each person engaged in R&D eventually generates 6 to 10 other jobs throughout the economy. As a consequence, the $48 billion annual national investment in R&D has a massive multiplier effect on our entire socioeconomic system.

Therefore, it behooves Congress to consider this investment carefully and to pay close attention to the ways in which it is allocated and used, as well as to the framework of laws, regulations, incentives, and constraints whereby the fruits of scientific research and development are converted into operational results.

Furthermore, R&D and the process of innovation help to determine the options and establish many of the parameters whereby specific technologies can be assessed for their potential impacts on society. In assessing a particular technology, the Office of Technology Assessment (OTA) compares its advantages and disadvantages with those of alternative technologies and assesses its impact on economic, social, environmental, and political factors within a perspective of probable future human needs, capabilities, and values.

To carry out its assessments effectively, OTA needs a thorough understanding of the Nation’s R&D effort and of the process whereby R&D results are converted into useful innovations. While helping to strengthen and integrate OTA’s overall assessment activities, such understanding also enables OTA to assist the Congress in better shaping the national investment in R&D by developing more soundly based R&D policies and priorities. Thus, through such understanding, OTA can more effectively fulfill its mandate to give Congress early indication of the impacts of technological change.

In response to these needs and the urging of a number of congressional committees and individual Members, the OTA Board authorized a Program of R&D Policies and Priorities, which became operational in May 1976.

Recognizing that such an assessment cannot be carried out effectively through a single, comprehensive project which attempts to address all facets of the problem, the Program was designed to proceed through a series of manageable, interrelated studies which will help to build an understanding of how to maximize the beneficial impacts of our total R&D enterprise.

The Program has operated with the guidance of three interrelated Advisory Panels made up of distinguished leaders of science, technology, industry, labor, the professions, and the consumer, environmental, and public interest movements.
The Panel on the Health of the Scientific and Technical Enterprise, chaired by Dr. Harvey Brooks, Benjamin Peirce Professor of Technology and Public Policy at Harvard University, has been concerned with ways we can maintain and enhance the health and vitality of the entire scientific and technical enterprise.

The Panel on the Applications of Science and Technology, chaired by Dr. Lewis M. Branscomb, Vice President and Chief Scientist of the IBM Corporation, has been concerned with how we can more effectively apply science and technology to ameliorate the processes of innovation, augment America’s international competitive position, solve national and social problems, and enhance the quality of life.

The Panel on Decisionmaking on R&D Policies and Priorities, chaired by Dr. Gilbert F. White, Director of the Institute of Behavioral Science at the University of Colorado, has been concerned with how we improve the decisionmaking processes whereby the Nation establishes policies and priorities for R&D.

During coming months, OTA will issue a series of reports on the Program all intended to inform and aid Congress in dealing with the complex issues of R&D policies and priorities.

The first of these reports is the Applications of R&D in the Civil Sector: The Opportunity Provided by the Federal Grant and Cooperative Agreement Act of 1977. This Act, which was signed into law February 3, 1978, is a major step forward in bringing greater order to the diversity of Federal assistance programs. The framework established by the Act has important implications for federally funded R&D and for the Federal impact on innovation involving private industry, the universities and nonprofit organizations, and State and local governments.

Over the next 2 years, the Office of Management and Budget (OMB) will be engaged in a major study of Federal assistance mandated by the Act. Through their oversight function, interested congressional committees have a key role to play in assuring the effective implementation of this Act.

America’s scientific and technical enterprise is a powerful instrument with enormous potential for national progress. How effectively this Act is implemented will be an important factor in determining how fully we tap that potential. It is hoped this report will aid Congress in shaping the effort.

Russell W. Peterson
Director
Office of Technology Assessment
Program on R&D Policies and Priorities Steering Committee

Russell W. Peterson
Director
Office of Technology Assessment

Jerome B. Wiesner
Chairman
Technology Assessment Advisory Council

Lewis M. Branscomb
Chairman
Panel on the Applications of Science and Technology

Harvey Brooks
Chairman
Panel on Health of the Scientific and Technical Enterprise

Gilbert F. White
Chairman
Panel on Decisionmaking on R&D Policies and Priorities

Ellis Mottur
Ex Officio

Application of Science and Technology Advisory Panel

Lewis M. Branscomb, Chairman
Vice President and Chief Scientist, IBM Corporation

Preston T. Bankston
Deputy Director, Office of Science and Technology
Mississippi Fuel and Energy Management Commission

Barry R. Bloom
President, Central Research
Pfizer, Inc.

Irving Bluestone
Vice President, Director
United Auto Workers
General Motors Division

Edward E. David, Jr.
President
EXXON Research and Engineering Company

Charles J. Hitch
President
Resources for the Future, Inc.

C. Lester Hogan
President and Chief Executive Officer
Fairchild Camera and Instrument Corporation

Alice Tepper Marlin
Executive Director
Council on Economic Priorities

Claire Nader
Independent Consultant

Arthur S. Obermayer
President
MOLECULON Research Corporation

Robert M. Solow
Institute Professor
Massachusetts Institute of Technology

Philip H. Trezise
Senior Fellow
The Brookings Institute

Herbert F. York
Professor of Physics
University of California at San Diego
Decisionmaking on R&D Policies and Priorities Advisory Panel

Gilbert F. White, Chairman.
Director, Institute of Behavioral Science, University of Colorado

Robert S. Browne
Director
Black Economic Research Center

Robert A. Charpie
President
Cabot Corporation

John W. Davis
Attorney
Adams and Davis

Martin Goland
President
Southwest Research Institute

Jerry Grey
Independent Consultant

Gerald B. Grinstein
Attorney
Preston, Thorgrimson, Ellis, Holman & Fletcher

Frederic A. L. Holloway
Vice President for Science and Technology
EXXON Corporation

Edward B. Lindaman
President
Whitworth College

Richard R. Nelson
Professor of Economics
Institute for Social and Public Studies
Yale University

Don K. Price
Professor of Government
John F. Kennedy School of Government
Harvard University

Lola Redford
Chairman of the Board
CAN’s Council on Environmental Alternatives

Donald B. Rice, Jr.
President
RAND Corporation

During 1977 Adam Yarmolinsky served as Cochairman of the Advisory Panel but resigned as of November 18, 1977, to become Counsel for the Arms Control and Disarmament Agency.

Note: While the Applications of Science and Technology Advisory Panel (listed on previous page) served as the principal advisory group for this report, the Decisionmaking on R&D Policies and Priorities Advisory Panel also provided advice, critique, and assistance during the project for which OTA is deeply grateful. Although these advisory panels recommended release of the report, OTA assumes full responsibility for the report and the accuracy of its contents.
Acknowledgments

Robert D. Newton, Chairman of the Task Force on Federal Grant-Type Assistance Programs of the U.S. Commission on Government Procurement, has provided valuable assistance throughout the project. A preliminary working paper was reviewed in a series of meetings with representatives of the National League of Cities/U.S. Conference of Mayors; New England Innovation Group; Public Technology, Inc.; International City Managers Association; National Security Industrial Association; Industrial Research Institute; and several Federal agencies. The report attempts to incorporate insights that emerged from those meetings. Comments and criticisms of the many people who reviewed a draft of this report also are gratefully acknowledged.
Federal efforts to foster technological change in the civil sector through the support of R&D have met with only limited success. In contrast, the Federal Government has been very successful in bringing about technological change in areas such as national security and space exploration, where it is the end user of the products of R&D. Bringing about technological change in the civil sector, however, requires that those non-Federal parties who produce, deliver, and use goods and services accept risk and commit resources. Consequently, the Federal Government’s R&D role in the civil sector should differ in fundamental ways from its role in areas where it is the end user of the products of R&D.

Approximately one-third of the Federal budget is disbursed through procurement or assistance transactions between the Federal Government and non-Federal parties. As an initial step toward eliminating confusion over appropriate Federal and non-Federal roles and responsibilities in this major area of Federal spending, the Federal Grant and Cooperative Agreement Act of 1977:

- Requires that assistance relationships be distinguished as a class from procurement relationships;
- Establishes uniform, Government-wide criteria for the use of contracts, grants, and cooperative agreements; and
- Mandates a comprehensive, 2-year study of Federal assistance to be conducted by the Office of Management and Budget (OMB).

This report shows how the requirements of the Act provide an opportunity to address in a comprehensive, Government-wide manner the appropriate Federal and non-Federal roles in cooperative efforts to foster technological change in the civil sector. Chapters 11 and 111 show how the assistance perspective and the framework of Federal/non-Federal relationships established by the Act could be used to incorporate into Federal R&D management the considerations that guide the actions of non-Federal users of the products of that R&D.

Chapter IV shows how this framework of relationships could facilitate congressional oversight of Federal efforts to foster technological innovation through revealing patterns of management practices that determine effectiveness.

Topics of particular interest included in the report are:

- Issues important to consider in the OMB Study (pp. 22-24);
- The issue of accountability and its relationship to effectiveness in stimulating technological change (p. 27);
- Background necessary for understanding the full significance of distinguishing assistance relationships as a class from procurement relationships (pp. 7-13);
- The issue of balancing public benefits and private gain in assistance relationships with commercial firms, and the role of openly competitive assistance awards (pp. 13-15);
- The characterization of Federal/non-Federal relationships reflected by the alternative legal instruments of grants, contracts, and cooperative agreements (pp. 19-20);
- The “joint business venture” character of the cooperative agreement and issues such as costsharing and patent rights associated with its use (pp. 20-22);
- Key questions with brief discussion to assist the Congress in overseeing Federal efforts to foster technological change (pp. 27-29); and
- A hypothetical scenario, dealing with innovation to meet a local government problem, to illustrate the approach to civil sector problems from an assistance perspective (appendix B).