

**AAAS REPORT
XXXII**

**RESEARCH AND
DEVELOPMENT
FY 2008**

Intersociety
Working
Group

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE
1200 New York Avenue, NW, Washington, DC 20005

The AAAS Board of Directors, in accordance with Association policy, has approved publication of this report as a contribution to the understanding of an important process. The interpretations and conclusions are those of the authors and do not purport to represent the views of the Board or the Council of the Association.

Printed in the United States of America

Copyright © 2007 by the
American Association for the Advancement of Science
1200 New York Avenue, NW, Washington, DC 20005

Intersociety Working Group

(see the Directory at the end of this report for contact information)

American Association for the Advancement of Science
American Astronomical Society
American Chemical Society
American Educational Research Association
American Geological Institute
American Geophysical Union
American Institute of Aeronautics and Astronautics
American Institute of Biological Sciences
American Institute of Physics
American Mathematical Society
American Physical Society
American Psychological Association
American Society of Mechanical Engineers International
Association of American Universities
Computing Research Association
Consortium of Social Science Associations
Council of Professional Associations on Federal Statistics
Ecological Society of America
Institute of Electrical and Electronics Engineers
National Association of State Universities and Land-Grant Colleges

Contents

List of Tables		vii
Preface		ix
PART I: OVERVIEW		
Highlights		3
Chapter 1	Federal R&D in the FY 2008 Budget: An Introduction <i>Kei Koizumi, AAAS</i>	5
Chapter 2	Historical Trends in Federal R&D <i>Kei Koizumi, AAAS</i>	21
Chapter 3	Political and Policy Context for the FY 2008 Budget <i>Kasey S. White and Lina Karaoglanova, AAAS</i>	29
Chapter 4	Education and Human Resources in the FY 2008 Budget <i>Joanne P. Carney, Daryl E. Chubin, and Shirley M. Malcom, AAAS</i>	37
Overview Tables		47
PART II: AGENCY R&D BUDGETS		
Chapter 5	R&D in the FY 2008 Department of Defense Budget <i>Kei Koizumi, AAAS</i>	63
Chapter 6	National Science Foundation in the FY 2008 Budget <i>Amy Scott and Tobin Smith, AAU</i>	71

Chapter 7	National Institutes of Health in the FY 2008 Budget <i>Kei Koizumi, AAAS</i>	81
Chapter 8	The Department of Energy in the FY 2008 Budget <i>Michael S. Lubell, APS</i>	91
Chapter 9	The National Aeronautics and Space Administration's FY 2008 Budget <i>Morgan P. Muchnick, AIAA</i>	101
Chapter 10	R&D in the U.S. Department of Agriculture <i>Elizabeth Allred, Eddie Gouge, and Ian Maw, NASULGC</i>	109
Chapter 11	R&D in the Department of Homeland Security <i>Kei Koizumi, AAAS</i>	115
Chapter 12	R&D in Selected Agencies (Commerce, DOT, Interior, EPA, VA) <i>Kei Koizumi, AAAS</i>	119
Agency Tables		127

PART III: DISCIPLINARY ANALYSES

Chapter 13	Physics in the FY 2008 Budget <i>Richard M. Jones and Audrey T. Leath, AIP</i>	163
Chapter 14	Astronomy in the FY 2008 Budget <i>L. Jeremy Richardson and Kevin B. Marvel, AAS</i>	169
Chapter 15	Atmospheric Sciences and Climate Change Programs in the FY 2008 Budget <i>Eugene W. Bierly and H. Frank Eden, AGU</i>	177
Chapter 16	Earth Sciences in the FY 2008 Budget <i>Linda Rowan and Erin Gleeson, AGI</i>	187

Chapter 17	Biological and Ecological Sciences in the FY 2008 Budget <i>Nadine Lymn, ESA; and Robert Gropp, AIBS</i>	193
Chapter 18	Chemical Sciences in the FY 2008 Budget <i>Ashley Predith, J. Carl Maxwell, Anthony Pitagno and Kathryn J. Hughes, ACS</i>	199
Chapter 19	Behavioral and Social Science Research in the Administration's FY 2008 Budget <i>Howard J. Silver and Angela L. Sharpe, COSSA; Heather Kelly and Patricia Kobor, APA; and Gerald Sroufe, AERA</i>	207
Chapter 20	Federal Statistics in the FY 2008 Budget <i>Edward J. Spar, COPAFS</i>	215
Chapter 21	Mathematical Sciences in the FY 2008 Budget <i>Samuel M. Rankin, III, AMS</i>	225
Chapter 22	Computing Research in the FY 2008 Budget Request <i>Peter Harsha, CRA</i>	233
Chapter 23	National Nanotechnology Investment in the FY 2008 Budget Request <i>M.C. Roco, ASME International</i>	243
Chapter 24	Electrotechnology-Related Research in the FY 2008 Budget <i>Robert Trew and Bill Williams, IEEE-USA</i>	255
Chapter 25	Mechanical Engineering in the FY 2008 Budget <i>Timothy Wei, ASME International</i>	265
	Appendix 1: Methodology and Data Sources	277
	Appendix 2: Definitions	279
	Appendix 3: Related Publications	281
	Appendix 4: COSEPP	282
	Intersociety Working Group Directory	283

List of Tables

Overview Tables

Table I-1.	R&D in the FY 2008 Budget by Agency	49
Table I-2.	Distribution of the FY 2008 Budget	50
Table I-3.	Historical Trends in R&D and Federal Outlays	51
Table I-4.	Major Functional Categories of R&D	52
Table I-5.	Defense and Nondefense R&D by Character of Work	53
Table I-6.	Federal Homeland Security R&D by Agency	54
Table I-7.	“FS&T” Budget by Agency	55
Table I-8.	R&D Funding by Congressional Appropriations Subcommittee	56
Table I-9.	Interagency Science and Technology Initiatives	57
Table I-10.	R&D at Colleges and Universities, FY 2005	58
Table I-11.	Historical Tables: Federal R&D by Agency, FY 1997-2008	59

Agency Tables

Table II-1.	R&D in the FY 2008 Budget by Agency and Character of Work	129
Table II-2.	R&D in the Department of Defense	136
Table II-3.	DOD R&D by Military Departments and Agencies	137
Table II-4.	Department of Defense Basic Research (“6.1”)	138
Table II-5.	Department of Defense “S&T” (“6.1” – “6.3”)	139
Table II-6.	R&D in the Department of Homeland Security	140
Table II-7.	R&D in the National Science Foundation	141
Table II-8.	R&D in the Department of Health and Human Services	144
Table II-9.	R&D in the National Institutes of Health, by Institute	145
Table II-10.	National Institutes of Health by Funding Mechanism	146
Table II-11.	R&D in the Department of Energy	147
Table II-12.	R&D in the National Aeronautics and Space Administration	151
Table II-13.	R&D in the U.S. Department of Agriculture	154
Table II-14.	R&D in the Department of Commerce	155
Table II-15.	R&D in the Department of Transportation	156
Table II-16.	R&D in the Department of the Interior	157
Table II-17.	R&D in the Environmental Protection Agency	158
Table II-18.	R&D in the Department of Education	159
Table II-19.	R&D in the Department of Veterans Affairs	160

Note: Tables within chapters are not included in this list.

Preface

Scientific research and development (R&D) continue to be of vital importance to the United States in the 21st century. The federal government supports a significant proportion of the nation's R&D, and its policies profoundly affect the institutions in which this work is carried out. The President's annual budget submission and the congressional debate that ensues are the mechanisms through which policies and priorities for R&D are set. Since 1976, AAAS has published an annual report analyzing R&D in the proposed federal budget in order to make available to the scientific and engineering communities and to policymakers timely and objective information about the Administration's plans for the coming fiscal year.

This year marks the 32nd in the series of AAAS R&D Reports. The effort was begun in 1976 in-house at AAAS, under the auspices of the Committee on Science, Engineering and Public Policy (Appendix 4). Shortly thereafter, it became a collaborative effort, and it now involves contributors from two dozen scientific, engineering, higher education, and industrial associations known collectively as the Intersociety Working Group (see the Directory at the end of this report for contact information for each association). This volume is one of several publications and activities of the AAAS R&D Budget and Policy Program. In addition to functioning as a stand-alone document, the report serves as background for the 32nd Annual AAAS Forum on Science and Technology Policy, held in Washington, DC (May 3-4, 2007).

The second publication appears after Congress has completed its appropriations process. At that time, AAAS publishes its annual review of the impact of congressional decisions on R&D, *Congressional Action on Research and Development in the FY 2008 Budget*. These publications are supplemented by R&D Funding Updates on the AAAS R&D Web site (www.aaas.org/spp/rd), which provide regularly updated information on R&D in the budget.

The overall structure of this report parallels that of recent editions. Part I, the overview, includes discussions of R&D's place in the federal

budget, the political context of FY 2008 R&D proposals, analysis of major funding trends for FY 2008, and analyses of funding for research. A chapter on funding for science, engineering, and mathematics education is also included in Part I. A set of overview tables appears at the end of this section.

The chapters in Part II examine the proposed R&D budgets of major federal agencies and departments. Tables detailing those budgets and the budgets of several smaller agencies and departments not featured in the chapters are included at the end of Part II. Finally, Part III consists of a set of cross-cutting analyses that look at the budget in terms of disciplines and areas of research.

Readers should be aware that the chapters in this report have been prepared largely independently of one another and under extremely tight deadline pressure. Although every effort has been made to assure a high quality product, some overlap and inconsistencies among the chapters are, unfortunately, inevitable.

On behalf of the members of the Intersociety Working Group, we would like to express our appreciation to the officers, members, and staffs of the participating organizations for their support and assistance in preparing this report. Our thanks also to the AAAS Committee on Science, Engineering and Public Policy (Appendix 4), which initiated the R&D Program and periodically reviews it and provides guidance to it. We are very grateful to individuals in the Office of Management and Budget, other federal agencies, on congressional staffs, and elsewhere who aided us in collecting the information and advised us on its interpretation.

Kei Koizumi
April 2007