

Appendix 1: Methodology and Data Sources

Within the federal budget there is no separately identified R&D budget as such; nor are most appropriations for R&D so labeled except for certain program areas, such as defense. Consequently, most funds for R&D are not line items in an agency's budget but are included within general program funding. The Office of Management and Budget (OMB) requires agencies whose annual R&D funding is greater than \$10 million to submit data on their R&D programs as part of their annual budget submissions. Specifically, the agencies provide data (reported on MAX Schedule C as part of the budget process) on funding levels for basic research, applied research, development, and R&D facilities (see Appendix 2: Definitions). However, agencies differ in their reporting. For example, some agencies classify program direction or management support as R&D; others do not.

In the data tables, the columns "FY 2003 Estimate" and "FY 2004 Request" represent the agencies' best estimates of actual and proposed federal funding for R&D collected during February 2003 by OMB and AAAS. These figures incorporate information provided to OMB by 26 agencies accounting for more than 99 percent of all federal R&D and information collected by AAAS from individual agencies after the budget is prepared. "FY 2004 Approved" figures are AAAS estimates of R&D contained in FY 2004 appropriations bills and their accompanying committee reports as approved by Congress and signed by the President in the fall of 2003 and in January 2004.

Due to rounding in the tables, the detail may not add to the totals, and the percentage changes may not correspond to the difference shown. Most figures are rounded to the nearest million; totals and changes are calculated from unrounded figures. In the tables, subtotals are occasionally provided for additional detail. These subtotals are shown in italics to indicate that they do not add into the totals.

Special Note on Table 2. Basic and Applied Research by Agency. Most R&D programs contain a mix of basic research, applied research, and development. Agencies determine what proportions of a program's R&D are basic and applied research. "FY 2004 Approved" figures for research (basic and applied) are AAAS estimates of basic and applied research contained in FY 2004 appropriations bills as approved by Congress and signed by the President in the fall of 2003 and January 2004, based on historical trends in basic and applied research and agency budget documents.

Special Note on Table 3. Major Functional Categories of R&D. All activities in the federal budget are classified into 20 broad functional categories. (AAAS separates the general science, space, and technology function into its subfunctions of General Science and Space). Each function often includes programs from several agencies. Each R&D program is assigned to only one function, even though the R&D activity may address several functional concerns.

Appendix 2: Definitions

In this report, R&D refers to actual research and development activities as well as R&D facilities. These definitions are used by the Office of Management and Budget, the National Science Foundation, and AAAS.

Research is systematic study directed toward more complete scientific knowledge or understanding of the subject studied. The federal government classifies research as either basic or applied according to the objective of the sponsoring agency.

- In **basic research** the objective is to gain knowledge or understanding of phenomena without specific applications in mind.

- In **applied research** the objective is to gain knowledge or understanding necessary for meeting a specific need.

Development is the systematic use of the knowledge or understanding gained from research directed toward the production of materials; devices; systems; or methods, including design, development, and improvement of prototypes and new processes. It excludes quality control, routine product testing, and production.

R&D funding normally includes those personnel, program supervision, and administrative support costs directly associated with R&D activities. Laboratory equipment is also included. Defense R&D also includes testing, evaluation, prototype development, and other activities which precede actual production.

Funding for **R&D facilities** includes construction, repair, or alteration of physical plant (e.g., reactors, wind tunnels, particle accelerators, or laboratories) used in the conduct of R&D. This also includes funding for major capital equipment used in the conduct of R&D.

The federal R&D funding data in this report are presented in terms of **budget authority**. Budget authority is the initial budget parameter for congressional action on the President's proposed budget. Other R&D data sources may express R&D funding in terms of obligations or outlays. There are also R&D data sources which obtain funding data from funding **recipients** (companies, universities) rather than from funding **sources** (agencies).

Budget authority is the legal authorization to expend funds.

Obligations represent orders placed, contracts awarded, services received, and similar transactions during a given period, regardless of when the funds were appropriated and when the future payment of money is required.

Outlays represent checks issued and cash payments made during a given period, regardless of when the funds were appropriated or obligated. Some surveys refer to outlays as expenditures.

As an example, Congress may appropriate \$100 million to NASA in FY 2003 for an R&D laboratory. NASA may then issue contracts to build the lab and sign \$50 million of the contracts in FY 2003 and \$50 million in FY 2004. Upon completion of the lab in FY 2004, NASA may then write checks to the contractors for a total of \$100 million. Budget authority would be \$100 million in FY 2003; obligations would be split \$50 million each in FY 2003 and FY 2004; outlays would be \$100 million in FY 2004. In the federal budget process, there is normally a lag between budget authority and outlays for large capital projects and research contracts; budget authority and outlays usually occur in the same year for recurring expenses such as staff salaries.

(Definitions adapted from National Science Foundation, *Federal R&D Funding by Budget Function: Fiscal Years 2002-2004*, Arlington, VA, 2003.)

Appendix 3: AAAS R&D web site

Updated information on federal funding for R&D, including the **complete text of this book, detailed agency analyses, revised historical tables, and supplementary materials**, is available on the AAAS R&D Web Site at:

<http://www.aaas.org/spp/rd>