

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 that precede actual production.

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

The allocation of agency budgets among basic research, applied research, and development is not an exact procedure; a certain arbitrariness is inevitably involved. The severe time pressures under which these figures are compiled for OMB are also a problem. Nevertheless, there is

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presumably some consistency within each agency's estimates so that the trends are meaningful.

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 that 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 2006 for an R&D laboratory. NASA may then issue contracts to build the lab and sign \$50 million of the contracts in FY 2006 and \$50 million in FY 2007. Upon completion of the lab in FY 2007, NASA may then write checks to the contractors for a total of \$100 million. Budget authority would be \$100 million in FY 2006; obligations would be split \$50 million each in FY 2006 and FY 2007; outlays would be \$100 million in FY 2007. 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 2007-2009*, Arlington, VA, 2008.)