

III. MAJOR FINDINGS AND ISSUES

The Board's preliminary findings are based on an intensive two-year study including review of the literature on Federal budget coordination and priority setting for science and engineering research, invited presentations from and discussions with representatives of OMB, OSTP, the Federal R&D agencies, Congressional staff, high level science officials from eight foreign governments, experts on data and methodologies, and industry and academic spokespersons. Discussions focused on research priority setting as it is practiced within government organizations and suggestions on how the process might be improved. After considering this information, the Board finds that:

- Federal priority setting for research occurs at three levels: 1) in setting Federal goals for research, 2) in the budget allocation processes for research within the White House and the Congress that in the aggregate produce the Federal research portfolio and 3) in Federal agencies and departments in achieving their missions and in accord with the President's priorities for research. The appropriate level for the Board to focus on enhancements is the second level.
- The allocation of funds to research is primarily a political process that should be informed by the best scientific advice and data available.
- A strengthened process for research allocation decisions is needed. Such allocations are based now primarily on faith in future payoffs, which are difficult to defend against alternative claims on the budget that promise concrete, more easily measured results and are supported by large and vocal constituencies.
- The pluralistic framework for Federal research is a positive aspect of the system, and increases possibilities for funding high risk, high payoff research. An improved process for budget coordination and priority setting should build on strengths of the current system and focus on those weaknesses that can be addressed by improved scientific input.
- There is a need for regular evaluation of Federal investments as a portfolio for success in achieving Federal goals for research, to identify areas of weakness in national infrastructure for S&T, and to identify a limited set of the top priorities for new research investments.
- Additional resources are needed to provide both Congress and the Executive branches with data, analyses and expert advice to inform their decisions on budget allocations for research.

Appropriate Scientific Advice

The scientific community can contribute to the Federal budget process as it now does within departments, agencies and programs, by providing:

- Reliable data and expert opinion on the most compelling major opportunities and needs for science and engineering, in the form of a small set of top research priorities for substantial additional Federal investment;
- Scientific advice including a mechanism to help in priority setting across fields of science and including multidisciplinary research and emerging areas;
- Estimating costs and benefits of various proposals, as well as overall funding levels, as input to decisions.

At the Federal level, advice on priorities for major research facilities is an area for particular attention. Facilities costs must be estimated and include long-term commitments for operation and maintenance. In addition, consideration must be given to tradeoffs to enable funding for priority facilities.

Alignment of the research budget advice and data with the Congressional budget process is essential if it is to be useful in Congressional allocation decisions.

Improved Data and Analysis

Allocation decisions should be informed by available data and should employ a range of methods of analysis and data sources. Over the long term there is a need for improvements in data, methods, and analyses that track Federal funds and measure the costs and benefits of research. Needs include:

- Broadly acceptable definitions of “research” especially at the field level--though admittedly difficult to establish--to enable unambiguous, self-consistent tracking of Federal funds and benefits across departments, agencies and sectors;
- Improved data for international comparisons, including both relative and absolute measures;
- Improved databases and other tools for tracking research funds and measuring outputs;
- Improved theoretical understanding of the relationship between publicly supported research and innovation;
- Improved measures of economic returns to research investments, as well as non-economic returns in improved quality of life; and
- Improved understanding of the relationship between research investments and the workforce.

Toward an Enhanced Process

The analytical and expert support available to inform research budget decisions need to be strengthened in both the Congress and the White House. A primary resource that would provide immediate benefits to decision makers is a broad-based, continuous capability for expert advice to both OMB and Congress during the budget allocation process. A longer-term need is the regular, systematic evaluation of the effectiveness of Federal investments in achieving Federal goals for research through OSTP. Complementing both are improved data and analysis on research opportunities and needs that trace Federal research investments through the budget process and beyond.

Strengthening the Federal mechanisms to inform research budget allocation decisions in the White House would add an important dimension to current mechanisms for scientific advice, which feature agency and department-based external and internal scientific input as part of their budget deliberations. It would require additional staff resources in OSTP and perhaps in Congress. Furthermore, investments in data systems and in academic research on the relationship between publicly funded research and economic and social benefits would enable improvements in methods for measuring and estimating returns on public investments. The payoff would be a more effective system for allocating Federal research funds to contribute to national goals, and improved tools for measuring and communicating the benefits of Federal investments to policy makers and the general public.