

NSTC Research Business Models Comments

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Thank you for initiating a review of policies and procedures directed towards improving the performance and management of federally funded science and engineering research. Please find my comments and suggestions below.

Summary of Concerns

It isn't a good idea to invest in R&D without assessing the effectiveness and net impact of that investment; conceivably, the current federally funded R&D programs deliver a net negative as opposed to a net positive impact. The specific areas of concerns are listed below followed by suggestions.

- 1) Excessive Overhead at the NIH.
- 2) Absence of Basic Performance Assessments.
- 3) Absence of Balance Across Disciplines in R&D Funding.
- 4) Disruptions of the S&E Workforce Due to Graduate Student-Postdoc Issues.

Accountability

"Analyzable" Funding Database

Before we can evaluate the performance and assess the overall impact, we need to know how the tax dollars are invested. To that end, as a first step towards improving accountability, I suggest development of an "analyzable" publically accessible funding database. The content could include key parameters of interest such as type of research (ie early stage, applied), type of study (ie laboratory, clinical), goal (ie advance knowledge of <whatever>, assess efficacy of treatment x vs y, etc), justification (explanation for why this research is funded, the pay-off), deliverable (ie knowledge, new technology, new treatment), outcome metric (ie the measure of performance), and outcome (success or failure). In addition, higher order parameters such as classification by disease, technology, or basic knowledge, etc could be available for the purpose of macro and program level summarization. Information on overhead costs, including extramural contracts, also needs to be available. In the end, it should be possible to conveniently assess progress towards meeting program level goals. The identification and classification of key parameters is best done by independent, non-government agency, third party resources, including professionals with diverse backgrounds (industry R&D, business management, etc) from the general population. It is of critical importance to involve the tax-paying public and potential consumers of the research.

Research on Research Program

In addition to a database, the federal government can provide support for a comprehensive research on research program by taking a proportion of the funding available to the funding agencies. Research on research initiatives could include development of R&D performance metrics, reviews of funding performance and process, etc. A monthly electronic funding newsletter reporting on the awards and the results associated with previously funded research can be supported. It is especially important to provide mechanisms and incentives for inviting participation from diverse groups.

Competition

Introducing transparency and inviting comments from an inclusive and diverse group can substantially increase performance and accountability, but introducing competition can potentially drive the funding towards even higher levels of effectiveness. This was evident with the sequencing of the human genome project, the government funded program came in early and on budget due to competition from the private sector company, Celera. Competition can be introduced by decentralizing the funding decision process, perhaps by shifting the dollars back to the states. Alternatively, establishing a competitive environment

across federal agencies, associated with break-up of the NIH into smaller, more focused research centers could represent another mechanism for introducing competition.

Basic-Applied Research Models

With respect to software development, a number of successful non-profit open source – commercial spin-off models have been established. This concept can be expanded to establish “communities” focused on tackling challenging applications. This type of structure can facilitate driving at least some of the R&D towards solving problems the private sector can’t address independently due to high R&D costs or small market size. This type of initiative contributes to the issue of accountability by providing a more direct, visible pay-off to the public.

To summarize, this level of transparency and ease-of-access to data provides opportunities for a broader range of feedback and peer review, a key component in improving performance. In addition, it provides a mechanism to more adequately inform the public.

Research Support

The current system, allocation of research dollars essentially via one agency (the NIH), clearly stifles innovation. This relatively homogenous group tends to jump on one “hot” area and funds that to the exclusion of anything else. Further, due to the lack of balance in the allocation of federal dollars, competent professionals in other fields tend to be displaced and leave research entirely. Finally, the workforce policies and practices, particularly with respect to the graduate and post-doc opportunities, drive talented professionals towards other careers leading to a well-established “brain drain” phenomenon. The suggestions submitted with reference to accountability are applicable with respect to research support. Transparency, performance, and accountability, with a focus on meeting clearly stated goals, are key to promoting innovation. For the short run, it is particularly important to address the NIH post-doc issues, the dumping of thousands of PhDs disrupts the market, ultimately suffocating innovation by via creating conditions of severe overcapacity.

Multidisciplinary/collaborative research

Grants proposing this type of research are likely not written and submitted due to a number of factors, 1) an expected low probability of success in obtaining funding, 2) obstacles preventing many professionals working at universities to find the time and opportunity to broaden the scope of their research, and 3) a record of funding the same professionals lacking the concept of a team approach (ie they have to be the “big chief”). Multidisciplinary teams are the rule rather than the exception in R&D intensive companies, and frequently large, well-funded universities can support integration across disciplines. Providing opportunities for industry R&D professionals to re-enter academic research could perhaps facilitate increased collaborative research. But the most substantial changes can come from restructuring the peer-review process and broadening the pool of applicants by increasing the probability of obtaining funding for new investigators with new ideas.

Information Technology

The NIH could streamline the submission-funding process and also facilitate execution of clinical trials via effective application of information technology. Pharmaceutical industry already relies on document management and clinical trial software applications to streamline processing, the NIH has failed to successfully contract and install these types of applications. Review of the NIH overhead and establishment of performance metrics can encourage the NIH to move more aggressively towards delivering successful IT solutions to reduce overhead.