Peer Review and the Social Impacts of Science

Barry Bozeman and Daniel Sarewitz
April, 2001

Over the past 15 years or so, federal agencies funding civilian science have begun to realize that the "little science" ideal—single investigators pursuing independent research agendas—may not be an adequate model for connecting our public science investment to desired societal outcomes. As part of their attempts to strengthen these connections, agencies have created science centers, engineering research centers, multidisciplinary programs, problem-focused initiatives, and inter-sector partnerships.

More recently, and in response to Congressional prodding (1), the National Science Foundation (NSF) has sought to use the peer review process to enhance the societal value of its research portfolio. It has done so by emphasizing potential societal benefit as a criterion for peer review evaluation of individual-investigator research proposals. But a recent National Academy of Public Administration (NAPA) study (2) commissioned by NSF reports that this approach, as currently implemented, is unlikely to have much positive effect. According to the report, problems with NSF's approach range from a lack of "quantitative measures and performance indicators to track the objectives of the new merit review criteria," to skepticism or even outright opposition on the part of reviewers to the inclusion of social impact criteria to begin with. NAPA goes on to recommend a variety of actions that NSF could take to correct these problems, such as improving "the conceptual clarity of the objectives of the new criteria," and ensuring "genuine attention to the goals of the new criteria throughout the entire review cycle."

In our view, however, the weakness of NSF's approach does not lie in poor implementation, but in the underlying idea that the peer review process can be used to leverage more societal value from research. This idea, though undoubtedly well-meaning, is fundamentally flawed and should be scrapped.

This flaw derives in part from a misunderstanding of the relation of the individual scientist to the broader research enterprise. As depicted in Michael Polanyi's "Republic of Science," individual scientists can be viewed as autonomous components of a self-regulating knowledge-creation system (3). As such, scientists can pursue their individual activities without understanding—or needing to understand—the larger context in which they are working, or the cumulative impacts of their work on society. Yet, because of the self-regulating capacity of science, knowledge does advance and impacts do accumulate. Demanding that scientists evaluate each other's research on the basis of anticipated societal impacts would be like asking typical citizens to judge each other's actions on the basis of their contribution to the national interest. Neither scientists, nor citizens, are positioned to make effective judgments on these subjects. Yet this is precisely what NSF seeks to promote.

But another, equally important problem is that that scientists have no special claim to knowledge of "the social good." Why is the scientist who does research on the genetics

of grasses any more qualified to judge social good than the person who mows the grass? What is the training? The knowledge claim? The moral claim? Or, most importantly, the political claim? Assessment of the social significance of research requires some consensus on social goals. Such consensus is a matter of careful, hopefully democratic, social choice processes. The personal opinion of an individual scientist-peer reviewer does not embody such processes. (Scientists may, in contrast, may have a special ability to make technical judgements about whether a line of research is likely to contribute to a particular social goal already established through democratic process—but this is not what NSF is asking them to do.)

We believe strongly in the need for scientists to engage in socially beneficial work. But their capacity to do so most strongly derives from the institutional and organizational context in which their research is supported and conducted. If research policies at programmatic and higher levels do not focus on the pursuit of desired social outcomes, then peer review assessment of the social significance of individual research projects will be largely beside the point. On the other hand, if science programs are framed according to social outcome agendas, and research priorities are set with such agendas in mind, then individual investigators will continue to do what they do well: follow the money and use it to produce high quality research. But in this case, by doing well they will also be doing good.

For this reason, when Congress is concerned that particular agencies or programs are not contributing sufficiently to desired societal goals, they should not pass the buck to people who have (sometimes literally) a microscopic perspective. In such cases, Congress should do its job first by setting coherent priorities for the outcomes that they expect to be achieved from publicly funded research programs and agencies, and then by pursuing accountability at this same level. Scientists, meanwhile, should be left to go about the business of assessing the merits of the science.

1. J. Mervis, *Science* 291, 2533 (2001).
2. NAPA, A Study of the National Science Foundation's Criteria for Project Selection (February 2001).
3. M. Polanyi, *Minerva* 1:54 (1962).

Barry Bozeman is Regents' Professor in the School of Public Policy, Georgia Institute of Technology.

Daniel Sarewitz is Senior Research Scholar at Columbia University's Center for Science, Policy, and Outcomes.