The Value of Social, Behavioral, and Economic Sciences to National Priorities:
## A Report for the National Science Foundation

In response to a request from the National Science Foundation (NSF), the National Academies of Sciences, Engineering, and Medicine appointed an expert committee to help determine whether the federal government should fund research in the social, behavioral, and economic (SBE) sciences at NSF. Specifically, the committee was asked to examine whether SBE research furthers the mission of NSF and those of other federal agencies and advances business and industry.

In its report, the committee concludes that the social, behavioral, and economic sciences advance the missions of NSF and other federal agencies and serve well many of the most important needs of society. SBE research also can be applied to business and industry and has enhanced the U.S. economy. The report offers numerous examples to support these conclusions (a sample of which is included in this report highlights).

The report also offers recommendations to better enable SBE research to meet the nation's priorities—for example, urging NSF to undertake a strategic planning process to articulate the most important scientific questions in SBE disciplines and to prepare the next generation of scientists to be more dataintensive, interdisciplinary, and teamoriented. NSF should also undertake more systematic efforts to communicate the results and value of the SBE research it supports.

WHY SUPPORT RESEARCH IN THE SBE SCIENCES?

Every month the Gallup Poll asks Americans about the main problems facing the nation, and respondents point to issues, such as jobs, unemployment, the economy, health care, and race relations. These issues have clear social, behavioral, and economic aspects that need to be better understood, and SBE research can contribute to understanding and addressing them. Many other problems that at first glance appear to be

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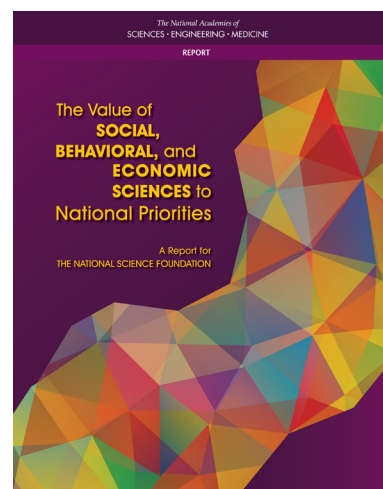
issues only of medicine or engineering or computer science also have social and behavioral components.

The diverse disciplines of SBE that are supported at NSF—anthropology, archaeology, economics, geography, demography, linguistics, neuroscience, political science, psychology, sociology, and statistics—produce fundamental knowledge, methods, and tools for a greater understanding of people, how they live, and how they interact with the rest of the world. Like all sciences, these disciplines bring a rigorous, methodical approach to pursuing knowledge—collecting data, formulating and testing hypotheses, analyzing evidence—that sheds light on the underlying nature of problems and can help point the way toward remedies.

DO THE SBE SCIENCES ADVANCE NSF'S MISSION?

NSF was created by Congress with the unique mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense." The report concludes that social, behavioral, and economic sciences contribute knowledge, methods, and tools furthering that core mission, and identifies examples of such contributions in each of the NSF national priority areas.

The report does not claim that NSF's entire portfolio of SBE research serves the NSF mission or that all SBE research serves national needs. First, as in all fields, SBE sciences progress through successes and failures. Second, the study committee could not do a comprehensive review of all SBE research in the time allotted and thus had to rely on examples.

Health. SBE sciences have played an important role in understanding the ways that people's health is affected by a combination of genes and the environment, and challenging long-held assumptions about what matters most to health. SBE research has also helped to identify specific public health needs and ways to promote healthful behavior and prevent illness.

For example, SBE research has revealed that Americans differ greatly in health and mortality depending on their social and economic circumstances, and that these differences have widened in recent decades. Research that compared generations born in 1912 and 1941 showed that between these two generations, life expectancy at age 65 rose by 6 years for people in the top half of the earnings distribution, but by only 1 year for those in the bottom half. Some groups, including middle-aged white women with a high school degree, have experienced rising death rates over the last two decades due in part to suicide, alcohol-related diseases, and the abuse of opioids. These and other findings about the health and mortality of the U.S. population provide important data for decisions about public health and government programs, such as Social Security, Medicare, and Medicaid.

Prosperity and welfare. The national need for "prosperity and welfare" stated in NSF's mission covers a wide range of issues that are of concern to U.S. citizens and that affect the well-being of the nation. Many of these—such as crime, safe neighborhoods, parenting, education, the economy, and financial well-being—have been topics of SBE research.

For example, SBE research has revealed new ways to encourage individuals to save more for retirement. Despite the rise of 401k and related investments that allow individuals to save for retirement, employers found that surprisingly few eligible employees—only 30 percent—signed up to put any of their salary into such plans, even when their employers matched funds. A dramatic increase in participation—to 90 percent—occurred as a result of a simple change: automatically enrolling workers and then allowing them to opt out, rather than requiring them to opt in to participate. This change was informed by research on how people make decisions, process complex information, and think about the future. The research was persuasive enough to lead to 2006 federal legislation requiring firms to make enrollment in such plans the default.

National defense. NSF's role in securing the national defense largely involves funding some of the basic research that its federal partners, such as the Army Research Laboratory and the U.S. Department of Homeland Security, later use to develop mission-specific tools and applications. For example, recognizing that terrorists' behavior responds to counterterrorism policies in rational ways, NSF-sponsored research used game theory to develop a model to inform counterterror policy. The U.S. Departments of Homeland Security and Defense have sponsored subsequent applications of this research, including applying it to government hostage negotiations and the first evaluation of the use of metal detectors to screen airline passengers.

DO THE SBE SCIENCES ADVANCE THE MISSION OF OTHER FEDERAL AGENCIES?

The report concludes that SBE research does play an important role in advancing the missions of federal agencies such as the U.S. Departments of Defense, Health and Human Services, and the 17 federal agencies that comprise the nation's intelligence community. For example, SBE research has informed agency work around:

- **Moving from welfare to work.** Data from the NSF-Funded Panel Study of Income Dynamics (PSID) played an important role in the welfare reform legislation of 1996, which involved multiple agencies. Counter to the commonly held belief at that time that women left welfare through marriage, PSID data showed that most women left welfare through work. The data also showed that women on welfare worked much more than most people assumed, but that their work was too poorly paid to lift them out of poverty. These findings influenced the inclusion in welfare reform legislation of work requirements and programs to provide the work-based assistance women needed to care for their families and become self-sufficient, such as child care services, transportation assistance, and medical care.

- **National security and counterterrorism.** NSF funded foundational research on social network analysis, which the Office of Naval Research and Air Force Research Laboratory then used to develop mission-specific tools that allow analysts to examine key questions, such as: "If this actor is removed from the network, who will likely fill the position in the organizational structure?" The tools have been used successfully in Iraq and Afghanistan to identify key tribal leaders, influential individuals, and the resources available to the network.

DO THE SBE SCIENCES ADVANCE THE WORK OF BUSINESS AND INDUSTRY?

The report concludes that SBE sciences have provided advances in understanding and methods that have been applicable to business and industry and enhanced the U.S. economy. For example, SBE research has contributed to:

- **A groundbreaking search engine.** The original version of Google's search engine resulted from a formula developed by two graduate students with NSF Digital Libraries funding in the late 1990s. In the early days of the Internet, search engines simply created indexes of Websites. The graduate students realized that the decision to link pages together required conscious effort and reflected human judgment about the significance of the link's destination. This realization led them to treat the collection of links as a network, where the centrality of a page in the network indicated the page's importance. Using earlier research by network analysts in mathematics and sociology, they created the page rank method, which was the main differentiating feature of the Google search engine.

- **Safer air travel.** Airline accidents have decreased dramatically over the past 30 years, a reduction partly due to improved aircraft crew training that is based on fundamental SBE research on team dynamics, leadership, and interpersonal communications. The airline industry used this basic research, combined with applied research conducted in cockpit simulators and analyses of actual cockpit flight recordings, to develop a training program called crew resource management or cockpit resource management (CRM). CRM is designed so that crew members can communicate effectively and consistently, form an instant team, and adopt well-understood and agreed-upon roles and behaviors. By the 1990s, this approach was a worldwide standard supported by the Federal Aviation Administration and international aviation organizations.

PREPARING FOR THE FUTURE

The report offers four recommendations to better enable SBE research to meet the nation's priorities and challenges.

Recommendation 1: The National Science Foundation (NSF) should undertake a systematic and fully transparent strategic planning process to provide a clear articulation of the most important scientific questions in the social, behavioral, and economic (SBE) sciences that are consistent with NSF's mission. In addition, NSF's strategic plan should specify the resources and methods required to advance the progress of SBE fields. The plan should reflect broad input from a wide array of stakeholders and put forth priorities for NSF support, while recognizing the need to have a broad and diverse portfolio of innovative projects whose applications may not be immediately apparent.

Recommendation 2: The National Science Foundation (NSF) should continue to support the development of tools, methods, and research teams that can be used to advance the social, behavior-

al, and economic sciences; facilitate their interactions with other science fields; and help NSF and other agencies and organizations more effectively address important national needs.

Recommendation 3: The National Science Foundation should support training consistent with the ways science is evolving across all scientific fields. Training should prepare the next generation of scientists to be more data-intensive, interdisciplinary, and team oriented.

Recommendation 4: The National Science Foundation (NSF) should undertake more intensive and systematic efforts to communicate the results and value of the social, behavioral, and economic (SBE) research it supports and how its grants advance the NSF mission. The NSF should encourage the broader SBE sciences community to increase its efforts to communicate the results and societal relevance of SBE research.

COMMITTEE ON THE VALUE OF SOCIAL, BEHAVIORAL, AND ECONOMIC SCIENCES TO NATIONAL PRIORITIES

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