

# CENTERS

## NSF SCIENCE AND TECHNOLOGY CENTERS



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## ABOUT PROFILES IN TEAM SCIENCE...

**Science and Technology Centers (STCs) have been established by the National Science Foundation (NSF) to support innovative and potentially transformative research and education projects that require large-scale, long-term awards.**

The STCs provide a means to undertake significant and complex investigations at the interfaces of disciplines and/or fresh approaches within disciplines. An STC typically involves several partner universities, dozens of faculty and postdoctoral researchers from different departments, scores of graduate and undergraduate students, and dozens of industrial and community affiliates. A center has the staff, resources, and time to make a much larger and far-reaching impact than usually is possible with smaller grants.

Topics addressed by the STCs run the gamut from understanding what's happening to the Earth's ice sheets to innovations in cybersecurity. One center is developing plastic electronics, while another develops novel water disinfection strategies. Although the STCs are working on different topics, they all are organized following a similar pattern: an integrated, 10-year program of research, education, diversity enhancement, knowledge transfer, and public outreach.

Yet, research shows that the outcomes of this kind of "team" science may not be easily covered within the constraints of the news media. There's a news gap, and many members of the general public may not make the connection between the center mode of operation and the results produced. What is different about team science? How is it working? What can it accomplish that couldn't be done otherwise? Why is it important for people to know about centers?

This booklet explores those questions. It is aimed at increasing awareness about the STCs in order for policymakers, the scientific community, members of industry, educators, and taxpayers to better understand the role that the team mode of research funding plays in solving critical problems facing society.

— **DEBORAH L. ILLMAN, Ph.D.**  
Editor, Profiles in Team Science  
NSF Discovery Corps Senior Fellow 2006-09

## ABOUT THE 2012 EDITION...

**The first edition of Profiles in Team Science focused on how team science and "centeredness" enabled cutting-edge research at each of the 17 STCs that were funded in FY 2000, 2002 and 2005/2006.**

This new edition updates the findings from the earlier edition, examines the legacy of the recently "graduated" FY 2000 cohort, and includes descriptions of the five new STCs funded in FY 2010.

In these pages, we showcase some of the key research results from the STCs and how they are being applied to a wide-range of important technological problems in our society. At the same time, we explore how the centers are providing a unique educational experience for the development

of the next generation of U.S. scientists and engineers grounded in interdisciplinary research and international settings.

We hope you are inspired and excited by the grand research challenges these centers are addressing.

— **CLIFFORD J. GABRIEL, Ph.D.**  
Acting Director  
Office of Integrative Activities  
National Science Foundation

# HISTORY AND OUTCOMES OF THE NSF SCIENCE AND TECHNOLOGY CENTERS

**In 1987, in his State of the Union address, President Ronald Reagan proposed the establishment of Science and Technology Centers (STCs) by federal agencies in order to enhance U.S. economic competitiveness. The National Science Foundation responded with plans to run a competition and fund a series of new STCs in FY 1988.**

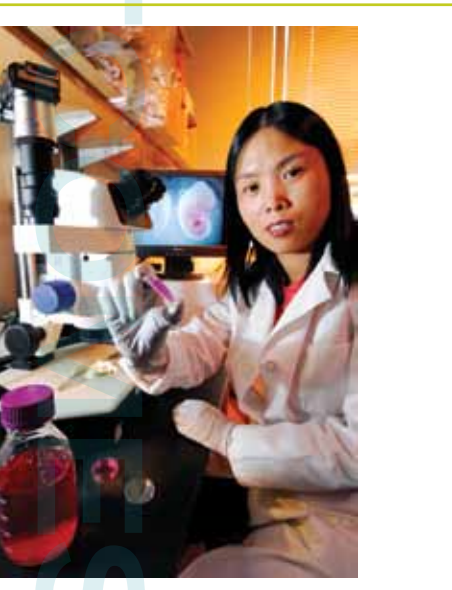
The NSF director at that time, Erich Bloch, sought advice from the National Academy of Sciences (NAS) on how to implement such a program. The NAS panel, chaired by Richard N. Zare, professor of chemistry at Stanford University, recommended that the STCs focus primarily on basic science in areas supported by NSF and that NSF should not constrain those areas in any one competition. The quality of the research and the need for a center mode of funding should be key criteria for funding.

The first solicitation, published in 1987, challenged investigators to propose research problems requiring significant resources in terms of equipment or facilities, or problems of great enough complexity, that the research could only be supported by a center. The expectation was that the STCs would be based in academic institutions; would provide education and research opportunities for students, postdoctoral fellows, faculty members and industrial fellows; would emphasize knowledge transfer to facilitate applications of scientific discoveries and thus address economic competitiveness of the United States; and would establish partnerships with other institutions.

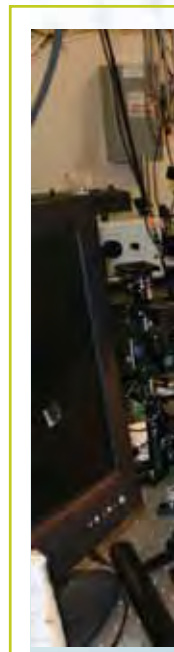
To date, there have been six competitions resulting in 47 centers: FY 1989 (11), FY 1991 (14), FY 2000 (5), FY 2002 (6), FY 2005/2006 (6) and FY 2010 (5). The program is administered by the NSF Office of Integrative Activities (OIA) (<http://www.nsf.gov/dir/index.jsp?org=OIA>).

Evaluations and assessment of the overall STC program, of STC centers and their impact or legacy, and of NSF management of the program have been carried out by the National Academy of Public Administration in 1995; the Committee on Science, Engineering and Public Policy (COSEPuP) of the National Research Council in 1996 ([http://www.nap.edu/catalog.php?record\\_id=5401](http://www.nap.edu/catalog.php?record_id=5401)); and Abt Associates, also in 1996.

More recently, in 2010, the American Association for the Advancement of Science (AAAS) assessed the impact of the STC program in terms of the research, education, knowledge transfer, diversity, and partnerships goals and how well the program addresses important grand challenges and emerging opportunities. The AAAS report is available on the web at <http://www.aaas.org/news/releases/2011/0301stc.shtml>.



Yuhong Fan of EBICS.  
Photo: Gary Meek, Georgia Tech





## PROFILES IN TEAM SCIENCE

Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation

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Photos courtesy of:

Top: CBST

Middle: CReSIS (left); CENS (right)

Bottom: C-MORE