National Science Foundation: Opportunities and Resources

A presentation by

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Program Director, Office of Integrative Activities

Experimental Program to Stimulate Competitive Research

National Science Foundation

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National Science Foundation

The National Science Foundation Act of 1950: “to promote the progress of science; to advance the national health, prosperity, and welfare; and to secure the national defense.”

National Science Foundation

The Vision

Advancing discovery, innovation, and education beyond the frontiers of current knowledge,

and empowering future generations in science and engineering

National Science Foundation

Strategic Goals

Discovery - advancing frontiers of knowledge

Learning - workforce and scientific literacy

Research Infrastructure - advanced instrumentation

Stewardship - research and education

National Science Foundation
by the numbers – FY 2006

$5.65 billion	Budget (obligations)
4%	NSF's Share of total federal R&D
54%	NSF's share of federal non-medical R&D
42,000	Proposals evaluated via competitive merit review
10,450	Competitive awards funded
42,000	Scientists and engineers evaluators
239,000	Proposals reviewed
42,000	Students supported by NSF Graduate Research Fellowships since 1952
170,000	People (researcher, postdoctoral fellows, trainers, teachers, and students) NSF supports directly

Transformative Research

- "*Transformative research is* … research driven by ideas that stand a reasonable chance of radically changing our understanding of an important existing scientific concept or leading to the creation of a new paradigm or field of science. Such research also is characterized by its challenge to current understanding or its pathway to new frontiers."

Dr. Arden L. Bement, Jr.
Director
National Science Foundation

National Science Foundation Investment Priorities

- Cyber-enabled Discovery and Innovation $52 million
- National Nanotechnology Initiative $390 million
- Ocean Research Priorities Plan $17 million
- Cybersecurity Research and Development $107 million
- EPSCoR $107 million
- International Science and Engineering $45 million

National Science Foundation Investment Priorities

Cyber-enabled Discovery and Innovation	$52 million
National Nanotechnology Initiative	$390 million
Ocean Research Priorities Plan	$17 million
Cybersecurity Research and Development	$107 million
EPSCoR	*$107 million*
International Science and Engineering	$45 million

EPSCoR's ORIGINS

NSF's 1979 statutory authority, Sec. 113.(a) of Miscellaneous Law 42 U.S.C. 182g, "… authorizes the Director to operate an Experimental Program to Stimulate Competitive Research (EPSCoR) to assist less competitive states that:

- Have historically <u>received little</u> federal research and development <u>funding</u>; and
- Have demonstrated a <u>commitment to develop their research bases</u> and improve science and engineering research and education programs at their universities and colleges."

EPSCoR

- **Purpose: To build the capacity of educational institutions to participate more fully in NSF research activities.**

EPSCoR OBJECTIVES

- To catalyze key research themes and related activities within EPSCoR jurisdictions that empower knowledge generation, dissemination, and application.
- To activate effective jurisdictional and regional collaborations among academic, government, and private sector stakeholders that advance scientific research, promote innovation, and provide multiple societal benefits.
- To broaden participation in science & engineering by institutions, organizations, and people within EPSCoR jurisdictions.
- To use EPSCoR for development, implementation, and evaluation of future programmatic experiments that motivate positive change and progression.

EPSCoR Eligibility Criterion

- Based on a jurisdiction's most recent three-year history of research funds awarded by NSF relative to the Foundation's total research budget for the same period.

- A jurisdiction is eligible to participate in EPSCoR if the level of research support is equal to or less than 0.75 percent.

NSF EPSCoR Cohorts

FY 1980

Arkansas
Maine
Montana
South Carolina
West Virginia

FY 1985

Alabama
Kentucky
Nevada
North Dakota
Oklahoma
Puerto Rico
Vermont
Wyoming

FY 1987

Idaho
Louisiana
Mississippi
South Dakota

FY 1992

Kansas
Nebraska

FY 2000

Alaska

FY 2001

Hawaii
New Mexico

FY 2002

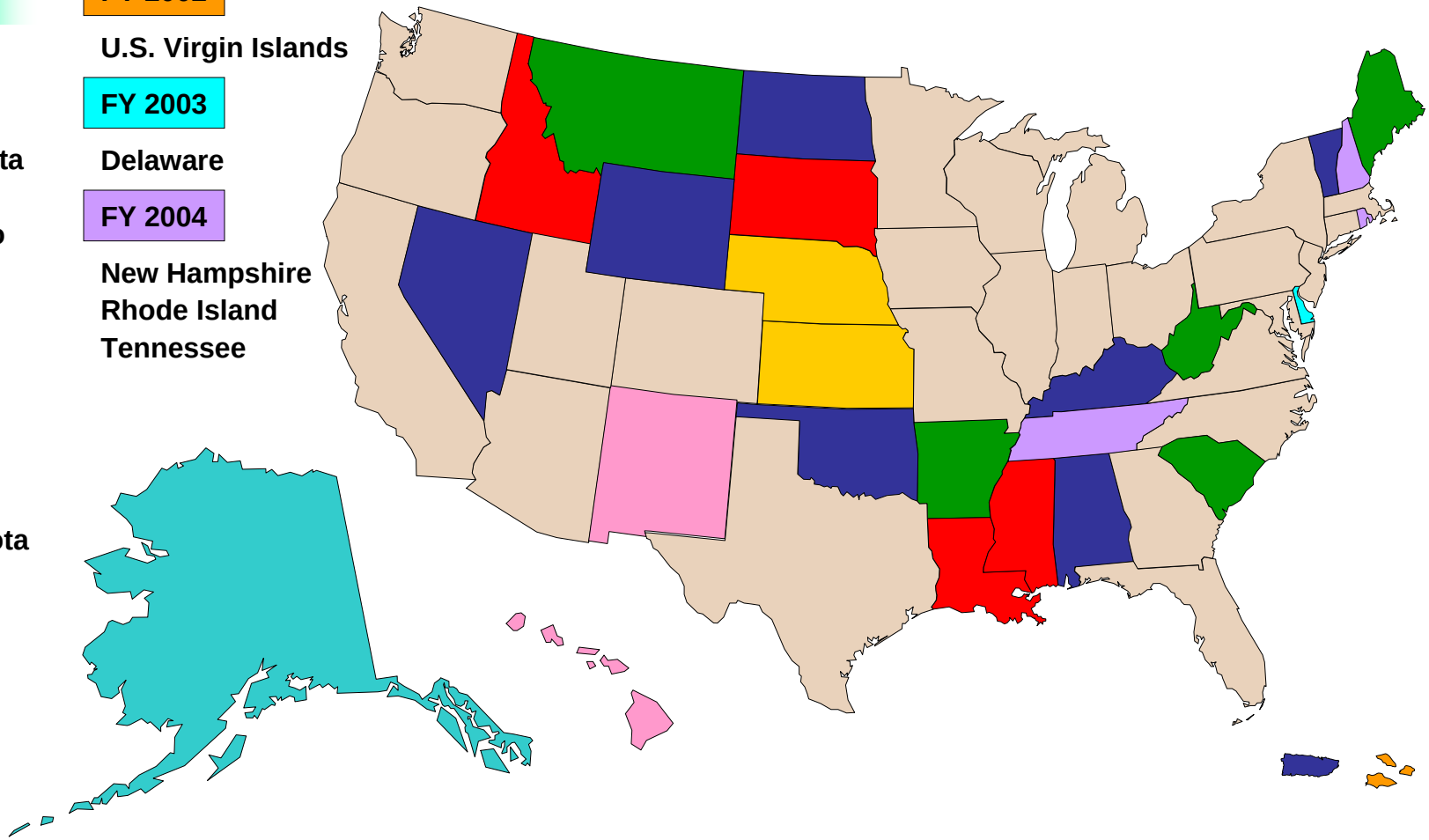
U.S. Virgin Islands

FY 2003

Delaware

FY 2004

New Hampshire
Rhode Island
Tennessee



Investment Strategies

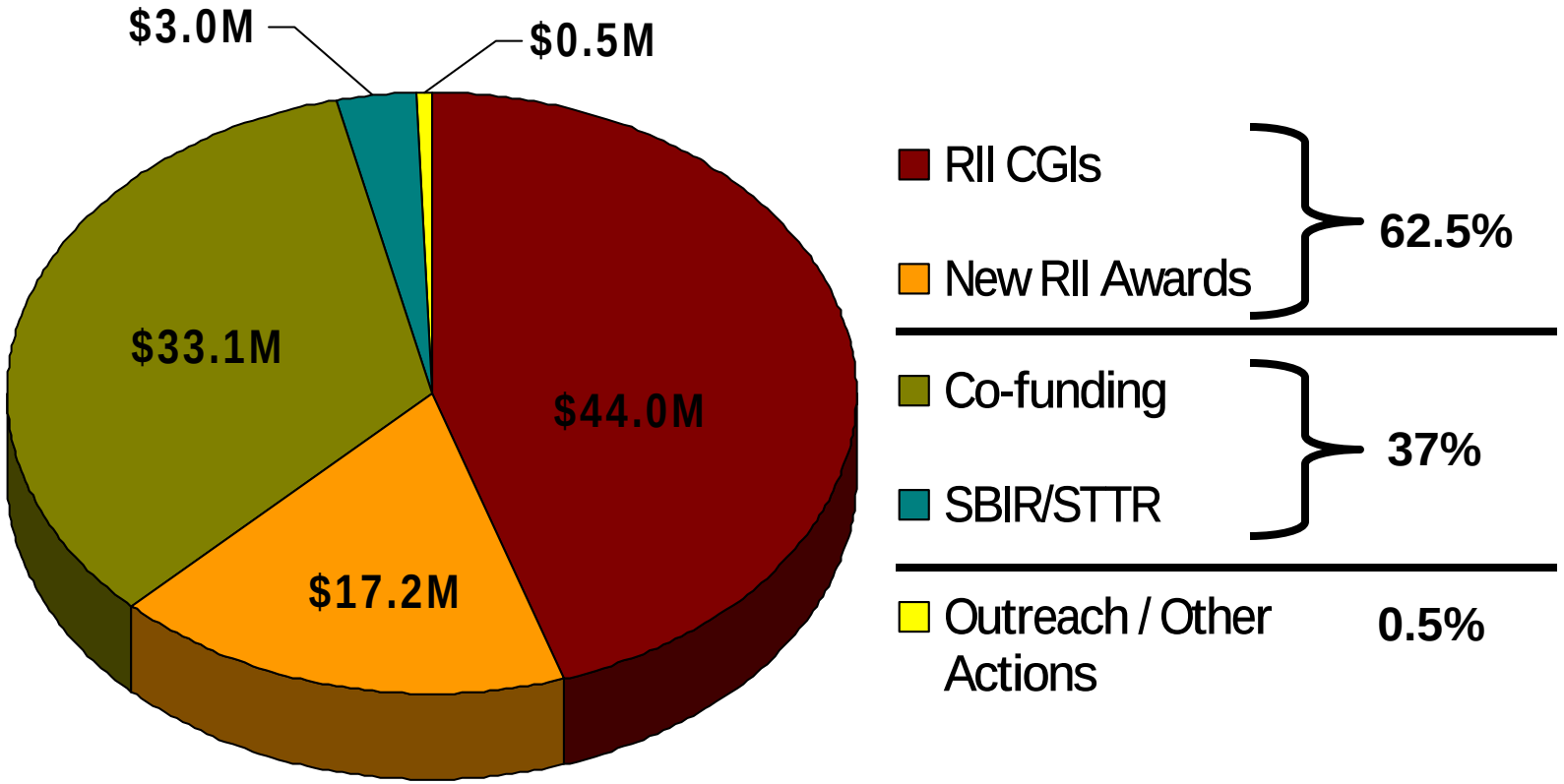
- **Research Infrastructure Improvement Grants**
  36-48 month grants of up to $3 million annually to support infrastructure improvements identified as being critical to the future R&D competitiveness of priority research areas

- **Co-funding –** Joint support of proposals submitted by EPSCoR researchers to NSF's regular grant programs

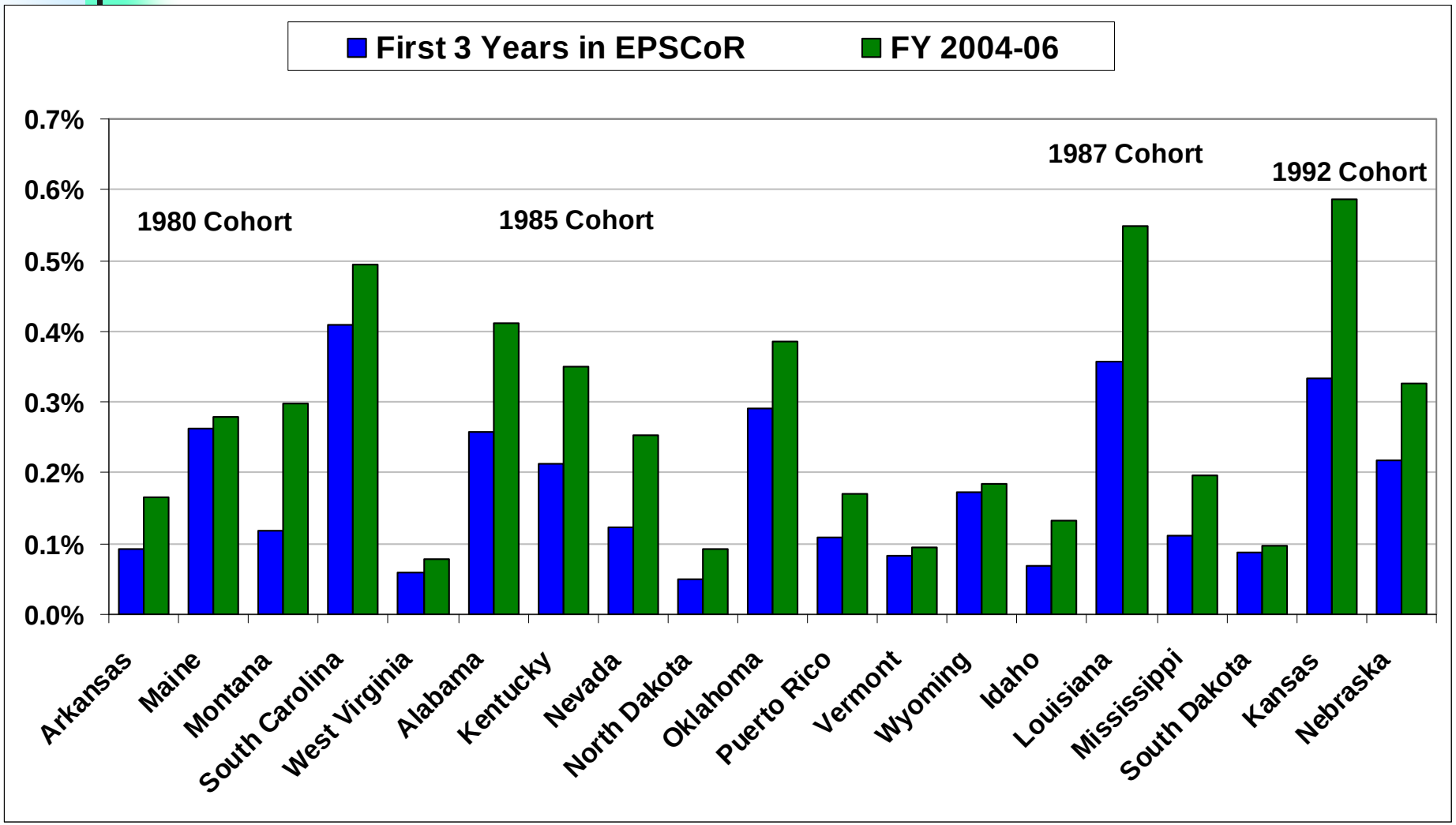
- **Outreach/Workshops** - Support of outreach visits by NSF program and professional staff and the conduct of workshops to acquaint EPSCoR researchers with NSF programs, priorities and policies

ALLOCATION OF FY06

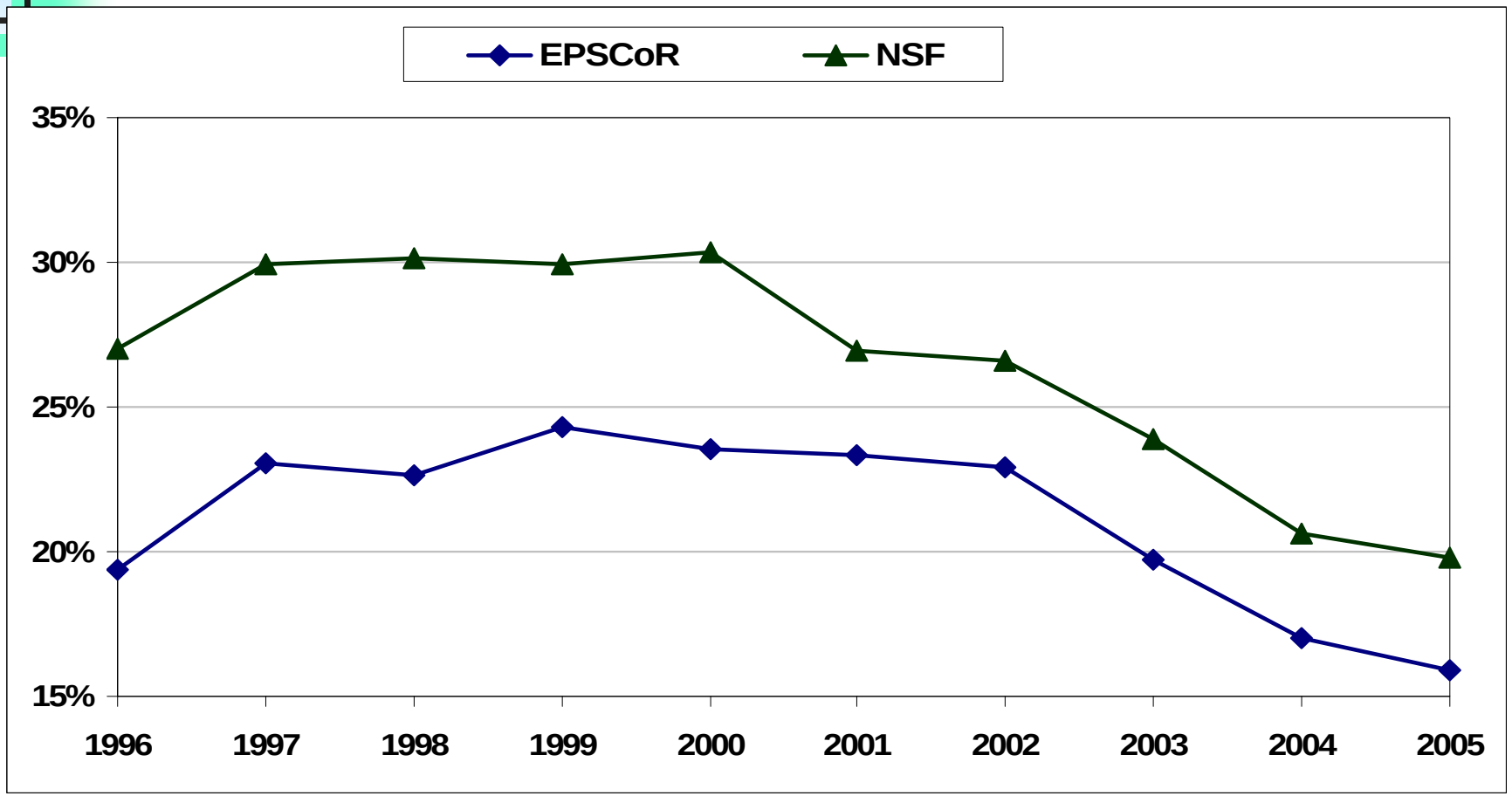
EPSCoR BUDGET ($97.8M)



EPSCoR States' Percentage of NSF Research Support Funding

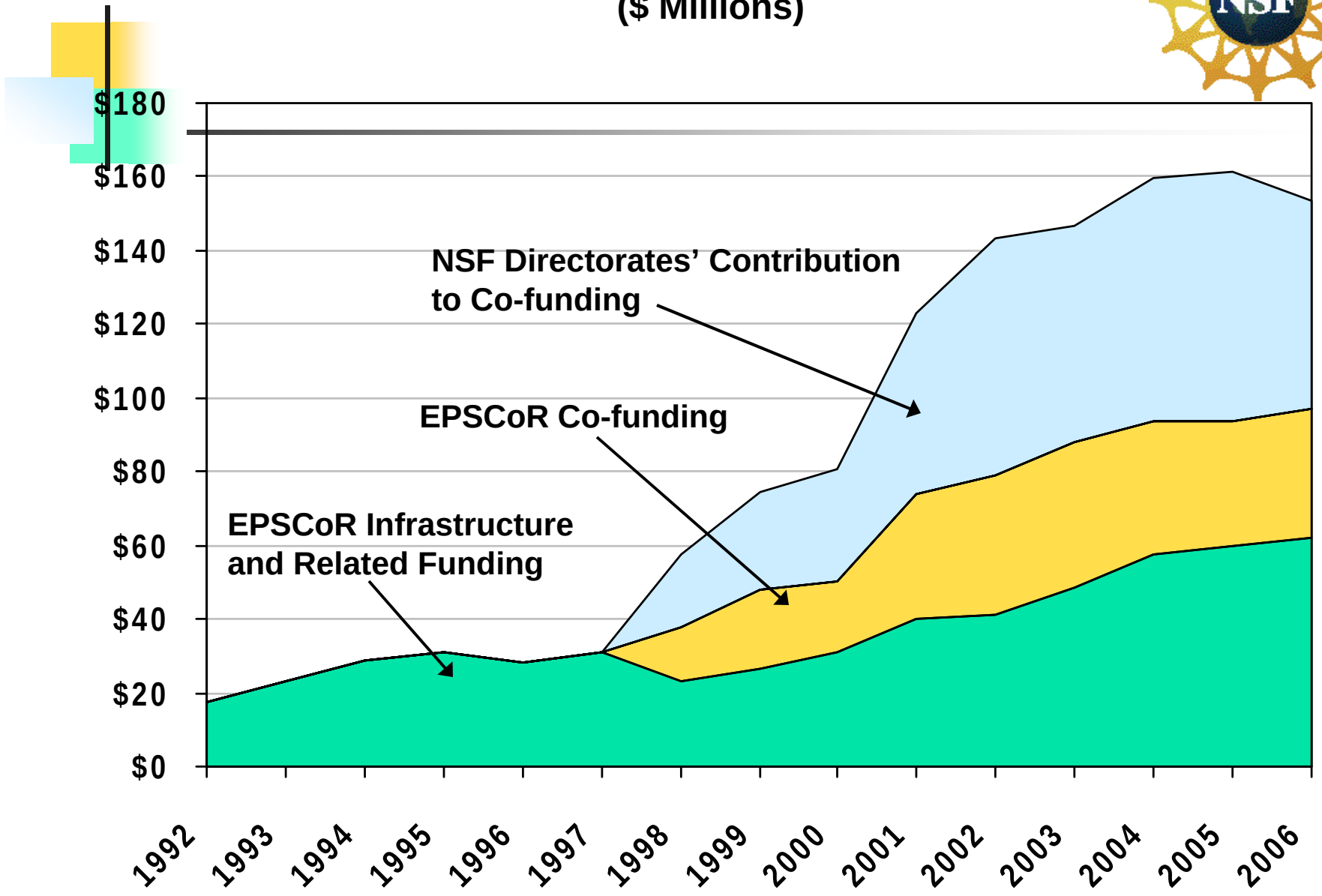


NSF Research Support Funding Rate: First 22 EPSCoR Jurisdictions

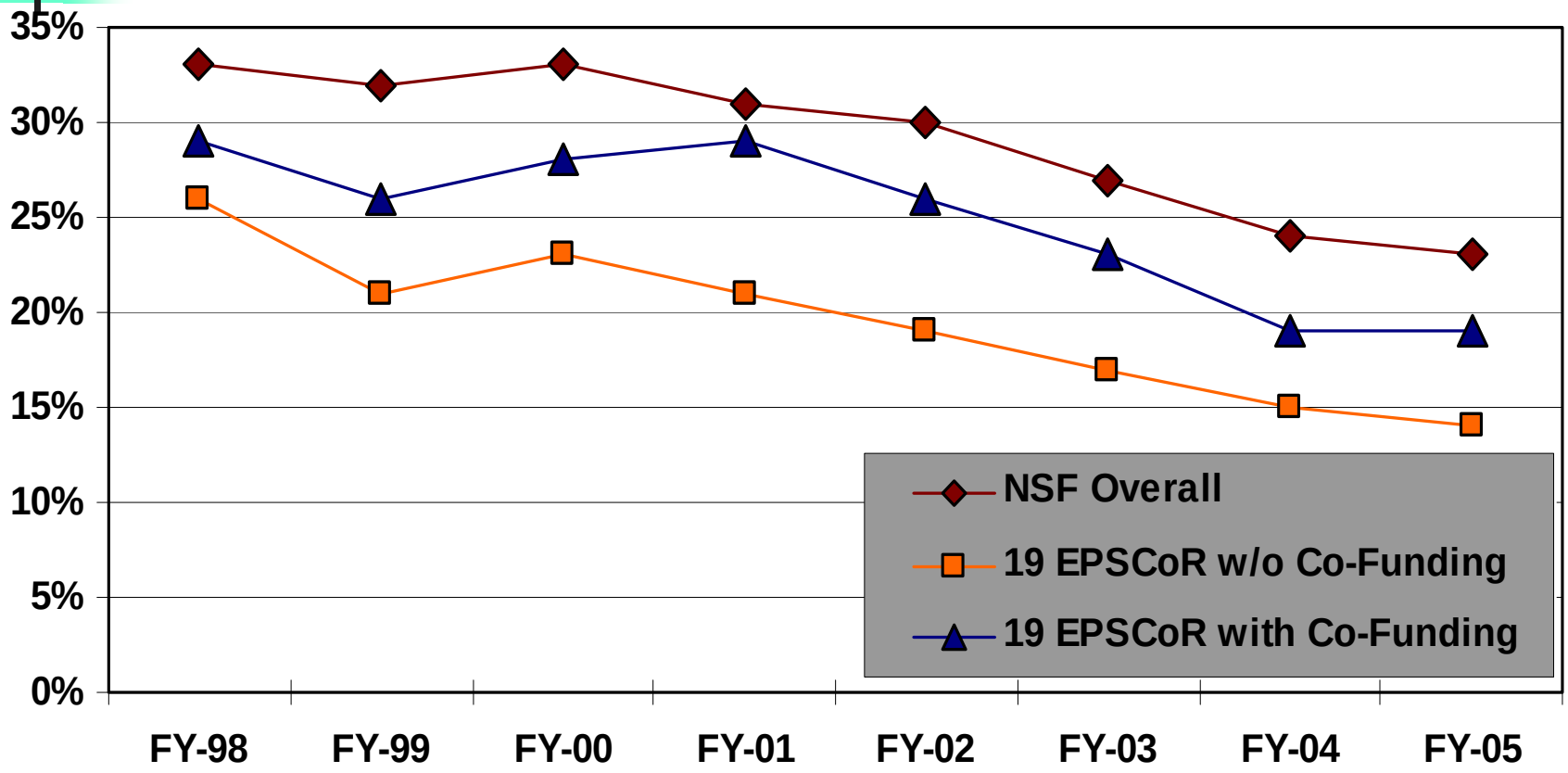


EPSCoR Funding Leveraged with NSF Directorate Funds

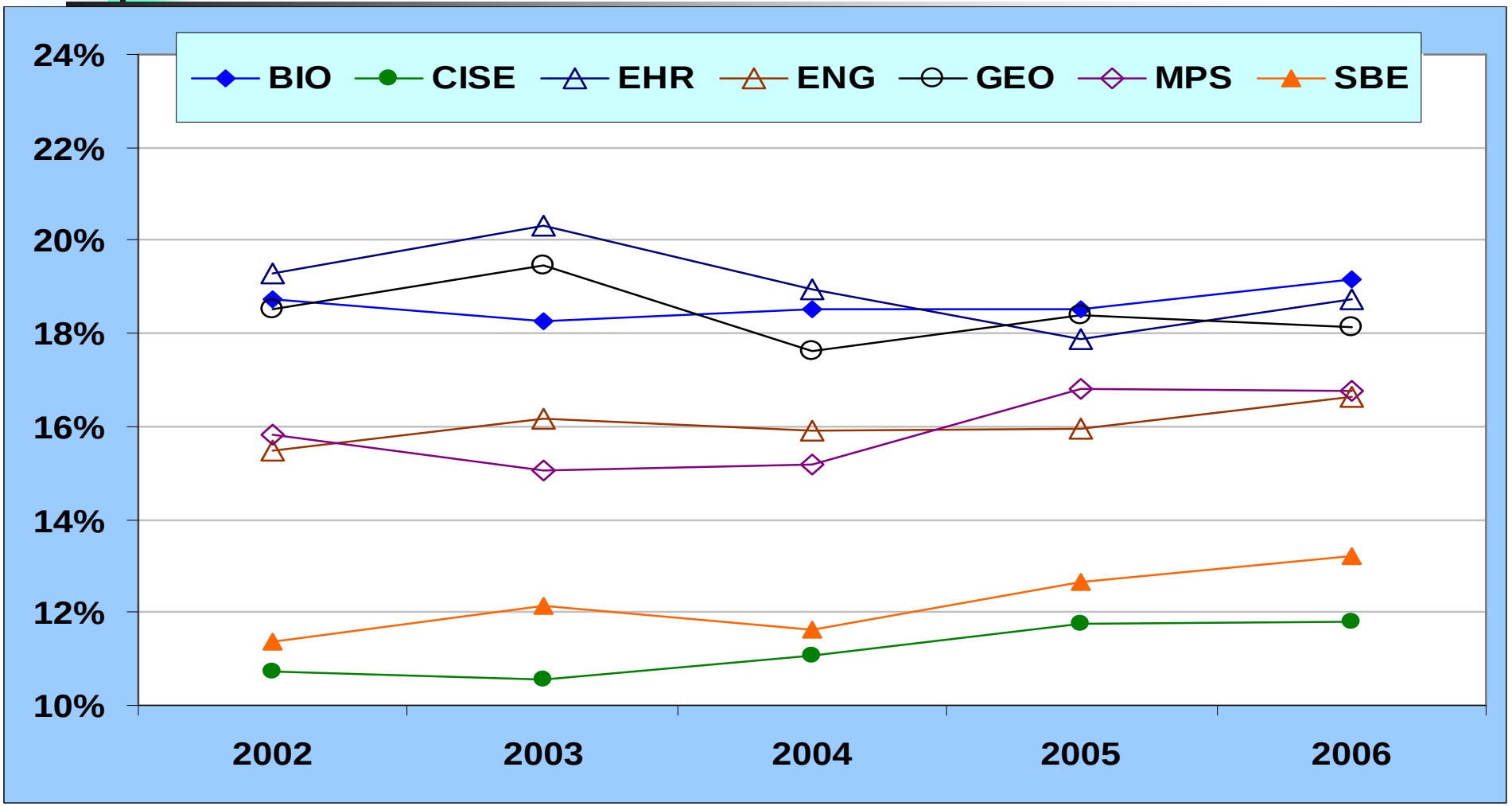
($ Millions)



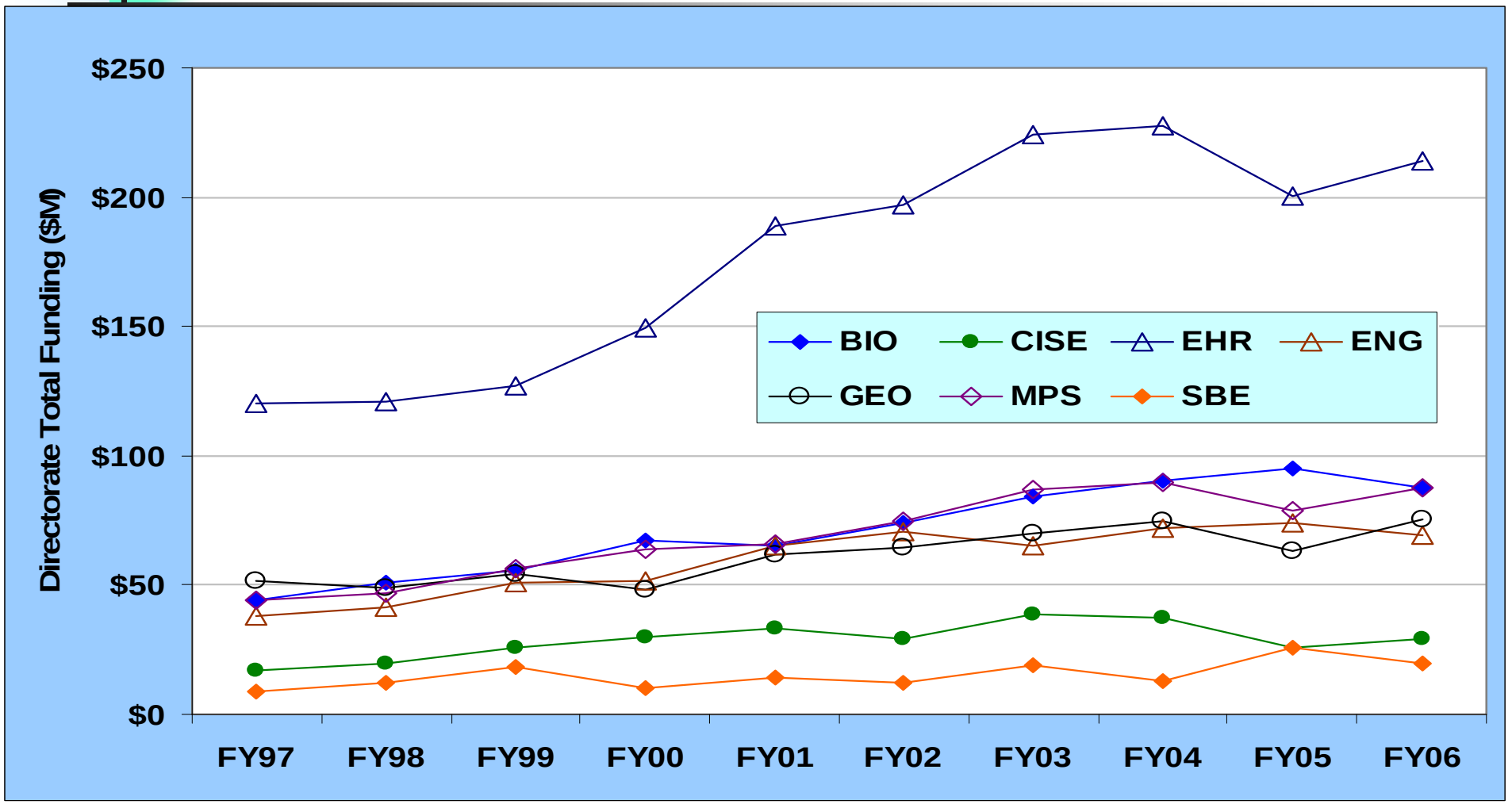
COMPARISON OF PROPOSAL SUCCESS RATES



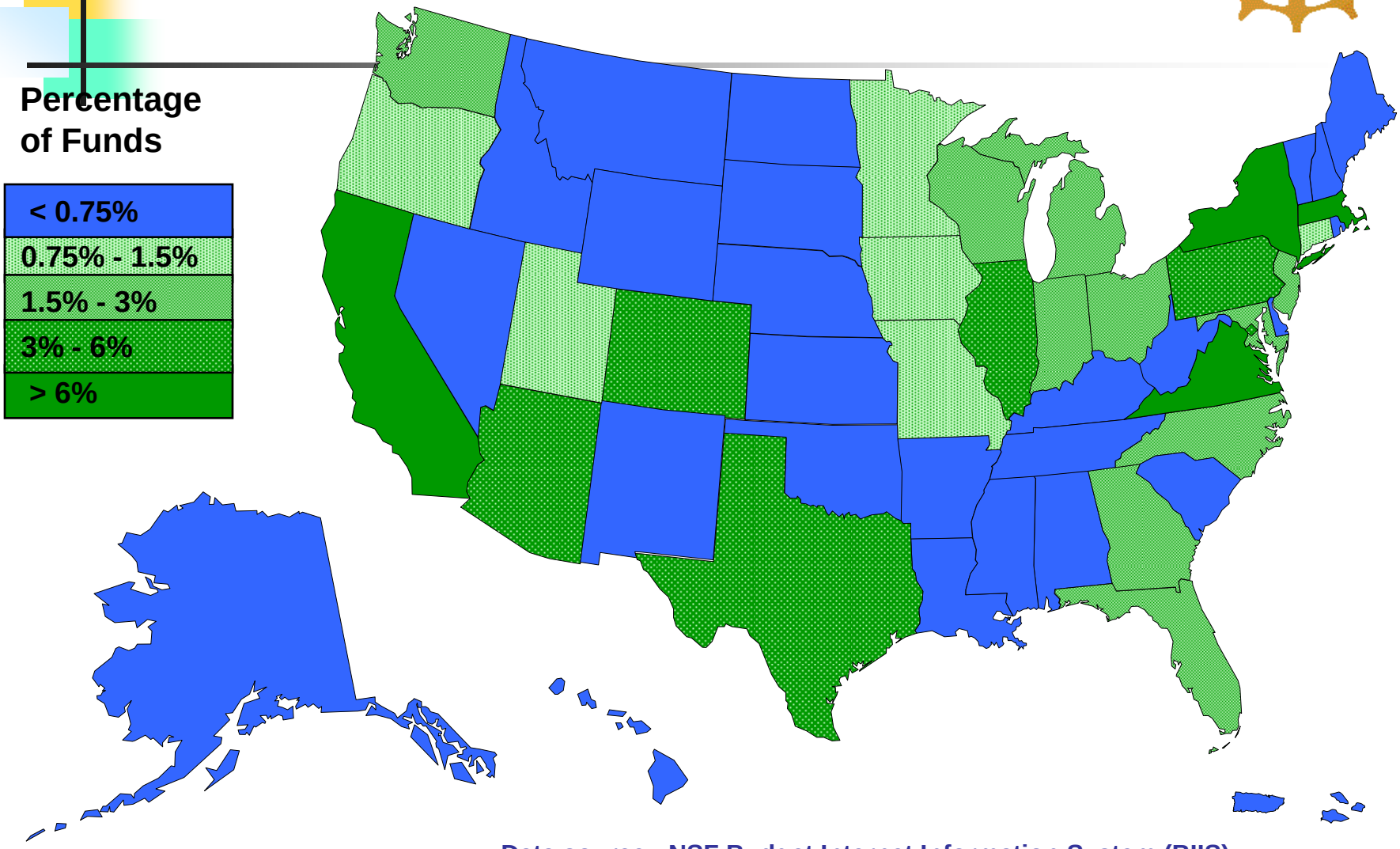
EPSCoR States' Percentage of Proposals Submitted to NSF by Directorate



NSF Total Funding to EPSCoR States by Directorate

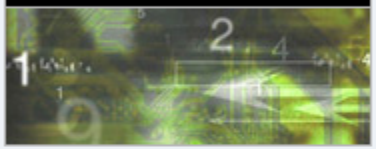


Distribution of NSF Research Funds (FY04-06)



Data source: NSF Budget Internet Information System (BIIS)

Funding



Funding
About Funding
A-Z Index of Funding Opportunities
Advanced Funding Search
Guide to Programs/Browse Funding Opportunities
Recent Funding Opportunities
Upcoming Due Dates

How to Prepare Your Proposal
Grant Proposal Guide
Frequently Asked Questions
Other Types of Proposals
Regional Grants Conferences

How to Manage Your Award
Grant Policy Manual
Grant General Conditions
Cooperative Agreement Conditions
Special Conditions

Crosscutting and NSF-wide Active Funding Opportunities

This site provides program information for activities sponsored by more than one NSF organization. In addition, all NSF organizations accept proposals that cut across organizational and programmatic boundaries. We suggest that those seeking support for interdisciplinary work not described here consult the NSF program site(s) closest to the science, engineering or education focus of the planned work and contact relevant program officers to discuss submission of a proposal.

Key: C Crosscutting | N NSF-wide

Status: Active

Sorted by Title. Click column headings to sort.

Title	Program Guidelines	Due Dates
ADVANCE: Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers C N	05-584	Full Proposal: January 27, 2006
Assembling the Tree of Life (ATOL) C	05-523	Full Proposal: March 27, 2006
Collaboration in Mathematical Geosciences (CMG) C	05-535	Full Proposal: February 1, 2006
Collaborative Research in Computational Neuroscience (CRCNS) C	04-514	Letter of Intent: December 1, 2005 Full Proposal: January 5, 2006
Communicating Research to Public Audiences N	03-509	

Programs For Specific Groups and Purposes

- Grant Opportunities for Academic Liaison with Industry (GOALI)
- Research in Undergraduate Institutions (RUI)
- Major Research Instrumentation (MRI)
- Integrative Graduate Education and Research Traineeship (IGERT)
- Faculty Early Career Development (CAREER) Program
- Research Experiences for Undergraduates (REU)
- NSF Graduate Teaching Fellows in K-12 Education
- ADVANCE: Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers
- Human and Social Dynamics (HSD)

Grant Opportunities for Academic Liaison with Industry (GOALI)

- Goals:
  - Catalyze industry-university partnerships
  - Encourage innovative application of academe's intellectual capabilities
  - Bring industry's perspective and integrative skills to academe
  - Promote high quality research and broaden educational experiences in industrial settings

- Proposal Requirements:
  - Co-PI from industry
  - Industry-university agreement on Intellectual Property
  - Statement describing the industrial R&D contribution
  - Specific plan for industry/university interaction

Grant Opportunities for Academic Liaison with Industry (GOALI)

- Eligibility Restrictions:
  - U.S. institutions of higher education that confer degrees in research areas normally supported by NSF may submit proposals on behalf of faculty members with full-time appointments
  - Only U.S. citizens or permanent residents eligible for fellowships

- Cost Sharing:
  - Cost Sharing has been removed from this latest version per NSFs Cost Sharing policy

Research in Undergraduate Institutions (RUI)

- Goals
  - Support high quality research with active involvement of undergraduates
  - Strengthen the research environment in undergraduate institutions
  - Promote integration of research and education in undergraduate institutions

Research in Undergraduate Institutions (RUI)

- Eligibility:
  - 20 or fewer Science and Engineering Ph.D. in 2 years

- Proposal Types:
  - Regular research
  - Multi-user instrumentation
  - Research Opportunity Awards

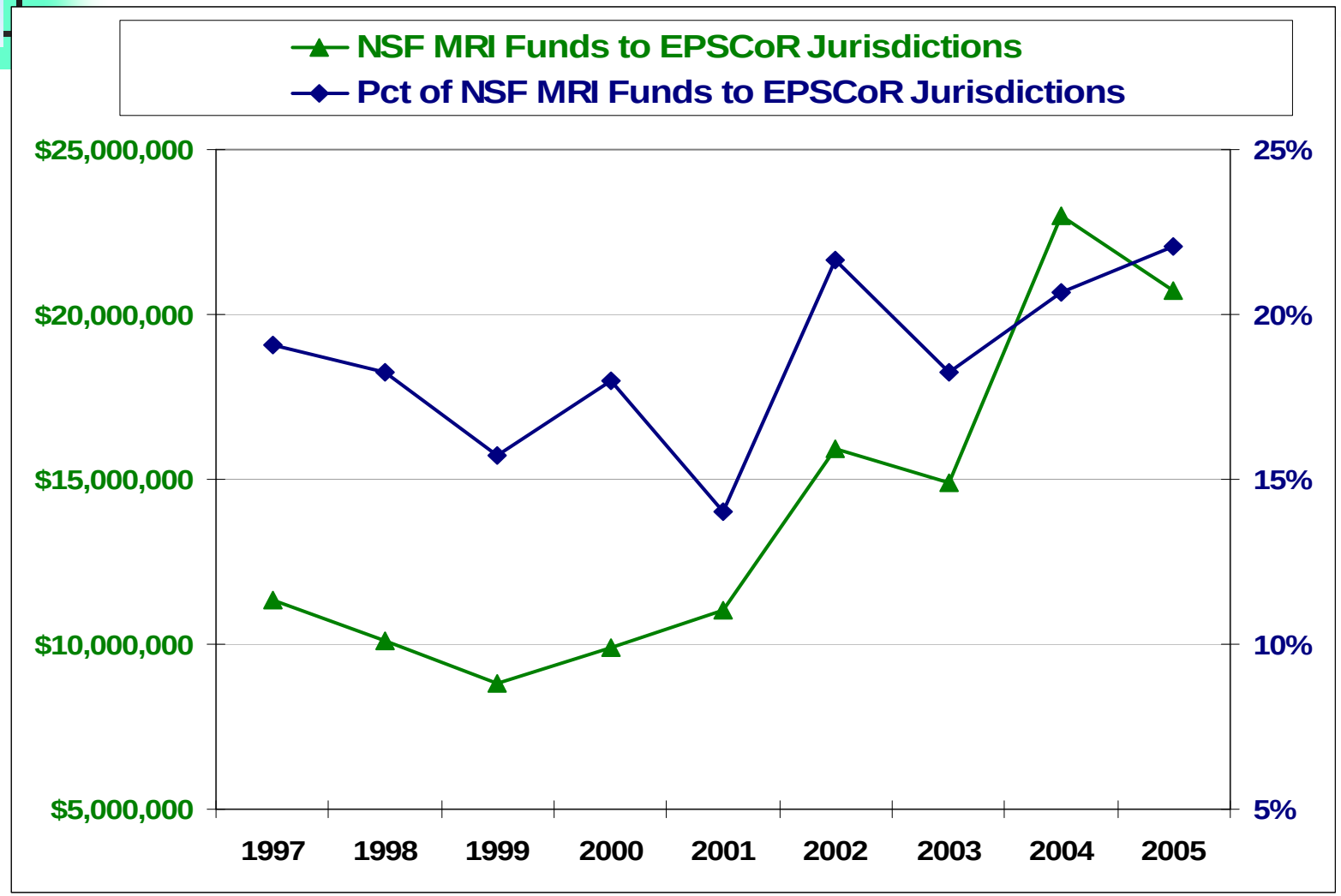
Major Research Instrumentation

- Support for a wide variety of mid-sized state-of-the-art research equipment
- Funding: FY 2006, $88.3 Million
- Special Emphasis: Support for Minority-Serving Institutions and Primarily Undergraduate Institutions

Major Research Instrumentation (MRI)

- Goal - to increase access to scientific and engineering equipment in U.S. academic institutions.
- Supports instrument acquisition and development.
- Three proposals per institution.
- Award size - $100,000 to $2 million

NSF MRI Awards to EPSCoR Jurisdictions



Faculty Early Career Development (CAREER) Program

- CAREER Program Objectives
  - Strongly encourage new faculty, emphasizing planning of an integrated academic career
  - Develop faculty who are both highly productive researchers and dedicated, effective educators
  - Form partnership with college or university to encourage balanced career development of individual faculty
  - Increase participation of women, members of underrepresented minority groups, and persons with disabilities

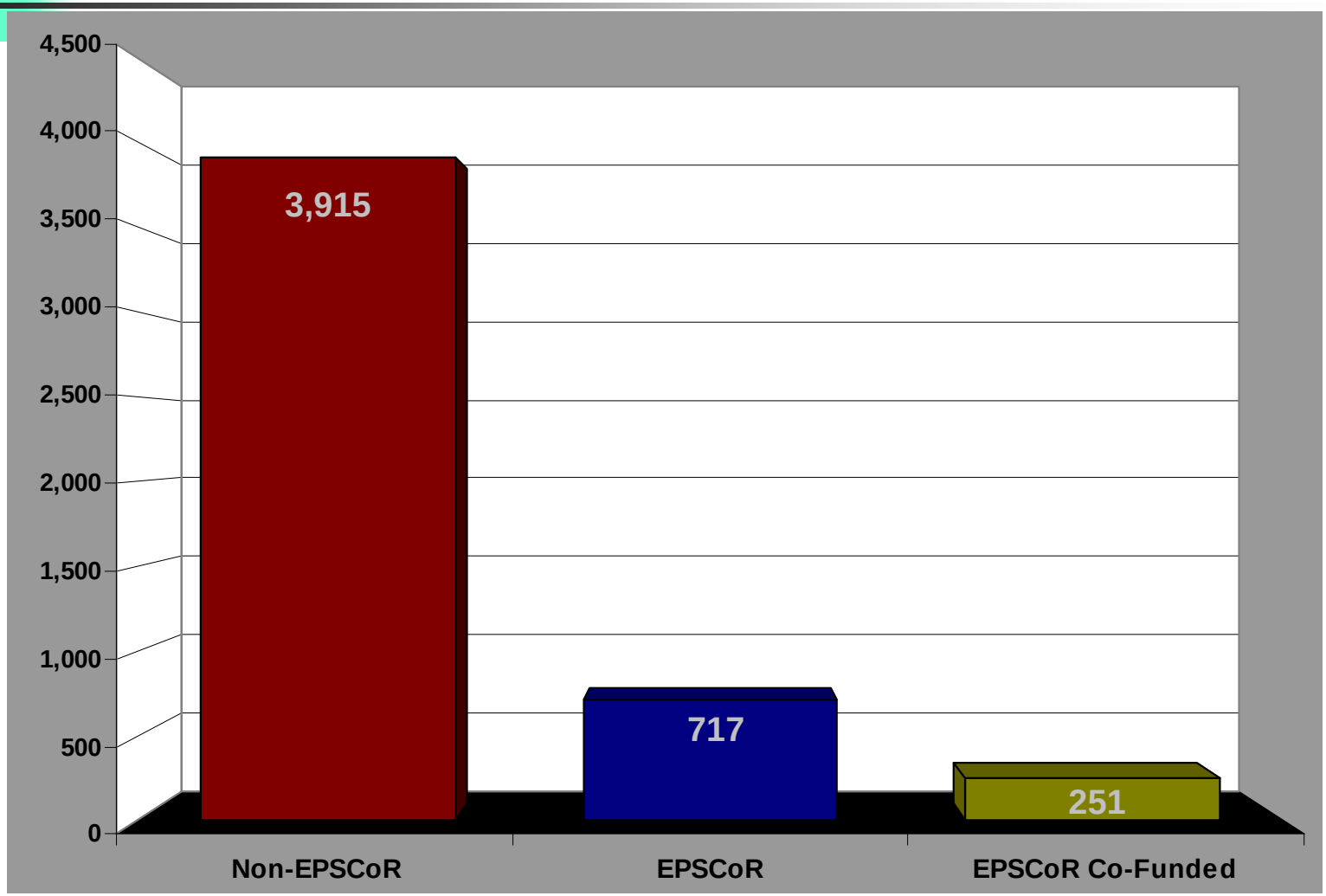
Faculty Early Career Development (CAREER) Program

- CAREER Guidelines
  - Review process varies by Directorate, and may be by mail, panel, or combination
  - Normal indirect cost rate applies
  - 5 year duration
  - Minimum Award: $400K over 5 years (Proposers to the Biological Sciences Directorate (BIO) must submit budget requests for a minimum of $500K for the 5-year duration).

Faculty Early Career Development (CAREER) Program

- CAREER Development Plan should include:
  - The objectives and significance of the proposed integrated research and education activities;
  - The relation of the research to the current state of knowledge in the field and of the education activities to the current state of knowledge on effective teaching and learning in one's field of study;
  - An outline of the plan of work, describing the methods and procedures to be used, including evaluation of the education activities;

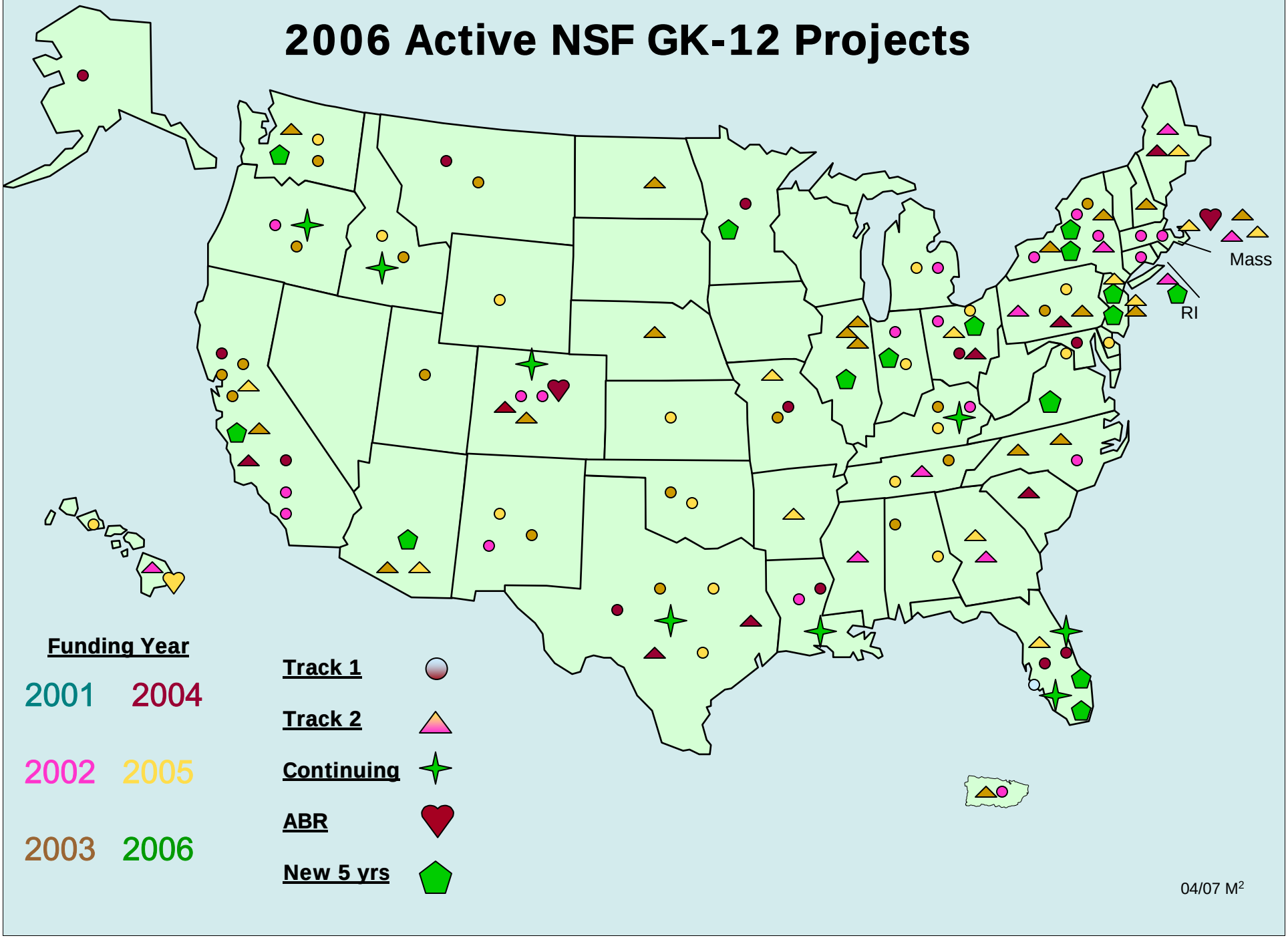
CAREER AWARDS (FY 1995-2005)



NSF Graduate Teaching Fellows in K-12 Education (GK-12)

- Expected Outcomes:
  - Improved communication and teaching skills for fellows
  - Enriched learning by K-12 students
  - Professional development opportunities for K-12 teachers
  - Strengthened partnerships between institutions of higher education and local school districts

2006 Active NSF GK-12 Projects



ADVANCE: Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers

- Goal:
  - Increase the representation and advancement of women in academic S&E careers, thereby contributing to the development of a more diverse S&E workforce

ADVANCE: Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers

- Three Types of Awards
  - Institutional Transformation
    - Improve institutional climate
  - Leadership
    - Recognize contributions by individuals and institutions, and enable further progress
  - Partnerships for Adaptation, Implementation, and Dissemination
    - Supports the analysis, adaptation, dissemination and use of existing innovative materials and practices that have been demonstrated to be effective in increasing representation and participation of women in academic science and engineering careers

Human and Social Dynamics (HSD)

- Aims to stimulate and support growth in knowledge about human action and development as well as organizational, cultural and societal adaptation and change

- Funding Amount: $55 million

- Fourth Year Emphases:
  - Agents of Change (AOC)
  - Dynamics of Human Behavior (DHB)
  - Decision Making, Risk, and Uncertainty (DRU)

Integrative Graduate Education and Research Traineeship (IGERT)

Goals

- To catalyze a cultural change in graduate education, for students, faculty, and institutions, by establishing innovative new models for graduate education and training in a fertile environment for collaborative research that transcends traditional disciplinary boundaries.

- To facilitate diversity in student participation and preparation, and to contribute to the development of a diverse, globally-engaged, science and engineering workforce.

Integrative Graduate Education and Research Traineeship (IGERT)

- Proposals should:
  - Be integrative, research-based, graduate education and training activities in emerging areas of science and engineering
  - Be organized around an interdisciplinary theme involving a diverse group of faculty members and other investigators with appropriate expertise in research and teaching
  - Provide students with experience relevant to both academic and nonacademic careers
- Awards:
  - For new projects, the first year award will be up to $400,000 and in amounts up to $600,000 for each of the next four years
  - For renewals, awards will be made in amounts up to $600,000 per year for a duration of five years

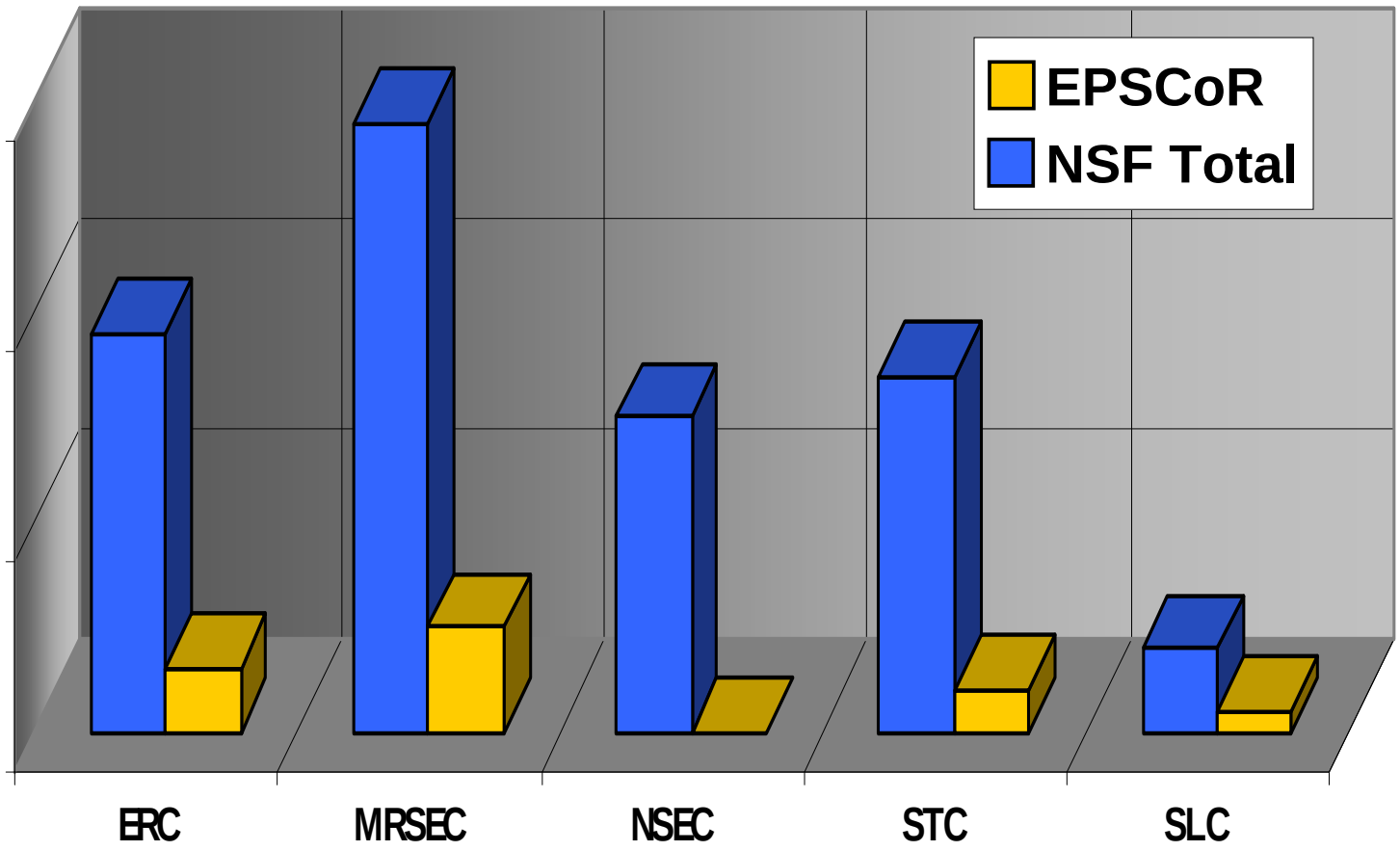
National Science Foundation Research Centers

- Types of Centers Supported by NSF
  - Centers for Teaching and Learning (CTL),
  - Engineering Research Centers (ERC),
  - Science and Technology Centers (STC), and
  - Materials Research Science and Engineering Centers (MRSEC).

National Science Foundation Research Centers Continued

- General Goals of NSF Centers
  - Supporting Cutting-Edge Research and Education,
  - Ensuring the Research Results Move into the Public and Private Domains Efficiently, and
  - Developing the Next Generation of Researchers and Educators.

EPSCoR Leadership of NSF Centers



Current NSF Centers Led By Institutions in EPSCoR Jurisdictions
(*Co-funded by EPSCoR)

ERC	Clemson U	Center for Advanced Engineering Fibers and Films (CAEFF)
ERC*	U Kansas	Center for Environmentally Beneficial Catalysis (CEBC)
ERC	Vanderbilt U	VaNTH ERC for Bioengineering Educational Technologies
MRSEC	Brown U	Center for Advanced Materials Research
MRSEC*	U Alabama	Center for Materials for Information Technology (MINT)
MRSEC*	U Nebraska	Q-SPINS: Quantum and Spin Phenomena in Nanomagnetic Structures
MRSEC*	U Oklahoma/U Arkansas	Center for Semiconductor Physics in Nanostructures (CSPIN)
MRSEC*	U Southern Mississippi	Center for Response-Driven Polymeric Films
SLC	Dartmouth College	Center for Cognitive and Educational Neuroscience (C-CEN)
STC	U Hawaii	Microbial Oceanography (C-MORE)
STC	U Kansas	Remote Sensing of Ice Sheets (CReSIS)

Minority Programs at NSF

- Graduate Research Fellowships to members of Underrepresented Groups (EHR)
- Minority Post Docs (BIO, SBE, ENG)
- Funding for Women, Minorities & Persons with Disabilities – High School Students (ENG)
- Significant Opportunities in Atmospheric Research and Science (GEO)
- Undergraduate Mentoring in Environmental Biology (BIO)

Minority Programs at NSF

Continued

- Louis Stokes Alliances for Minority Participation (EHR)
- Alliances for Graduate Education and the Professoriate (EHR)
- Notes:
  - The Minority Graduate Research Fellowship Program was evaluated in year 2000. It no longer exists as a program. Support for minorities is included among that for the overall program, Graduate Research Fellowship Program.
  - The Significant Opportunities in Atmospheric Research and Science initiative is a part of the National Center for Atmospheric Research Program.

Minority Programs at NSF

Focus: Minority Institutions

- Model Institutions for Excellence (NSF-wide)
- Centers for Research Excellence in Science and Technology (EHR)
- CISE Minority Institutions Infrastructure (CISE)
- Historically Black Colleges and Universities -Undergraduate Program (EHR)
- Tribal Colleges and Universities Program (EHR)

Minority Programs at NSF

Focus: Gender-Based Programs

- Gender Diversity in Science, Technology, Engineering, and Mathematics Education (EHR)
- ADVANCE (NSF-wide)
- Women in Engineering & Computer Science (CISE, ENG)

Minority Programs at NSF

Focus: Persons with Disabilities

- Program for Persons with Disabilities (EHR)

Minority Programs at NSF

- Major Programs with Components Directed to Broadening Diversity
  - Research Experiences for Undergraduates,
  - Research Experiences for Teachers,
  - Centers for Learning and Teaching,
  - Opportunities to Enhance Diversity in the Geosciences,
  - Science and Technology Centers, and
  - Engineering Research Centers.

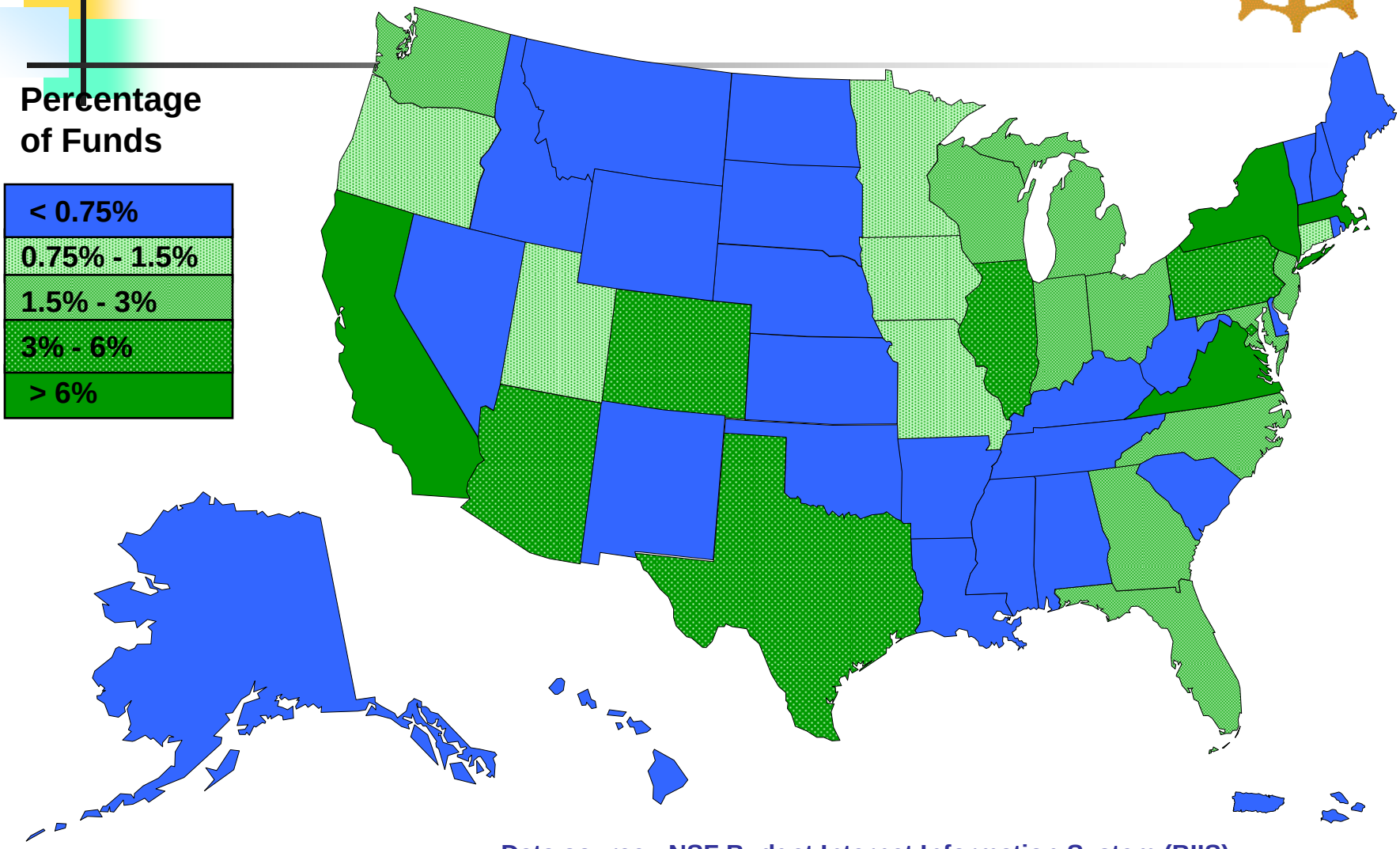
Research Experiences for Undergraduates (REU)

- REU Sites
  - Goals:
    - Initiate and conduct undergraduate research-participation projects
    - Create research environment with strong faculty-student interaction
  - Recruitment:
    - Significant percentage of students from outside host institution

Research Experiences for Undergraduates (REU)

- REU Supplements
  - Goal:
    - Attract undergraduates into science by providing an active research experience
  - Guidelines:
    - Add one or two students to an active ongoing project
    - Must be U.S. citizen or permanent resident
    - No indirect costs (administrative allowance of 25% of student stipend)
    - Awards 6K
    - Ask Program Officer about due dates

Distribution of NSF Research Funds (FY04-06)



Data source: NSF Budget Internet Information System (BIIS)

Guidelines for R&D Investments

- Put all the pieces together
- Make the right bets
- Invest in collaboration
- Enlist experts
- Be consistent while embracing change
- Measure results

Getting Involved

- Discuss Your Plans with the Appropriate NSF Program Officer, and Make Use of His/Her Feedback.
- Form Partnerships with Major Research Centers Funded by NSF.
- Collaborate with Researchers at Educational Institutions, National Laboratories, and/or Research Centers.
- Apply for Individual Research and/or Education Grants.

National Science Foundation

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National Science Foundation

Thank You

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