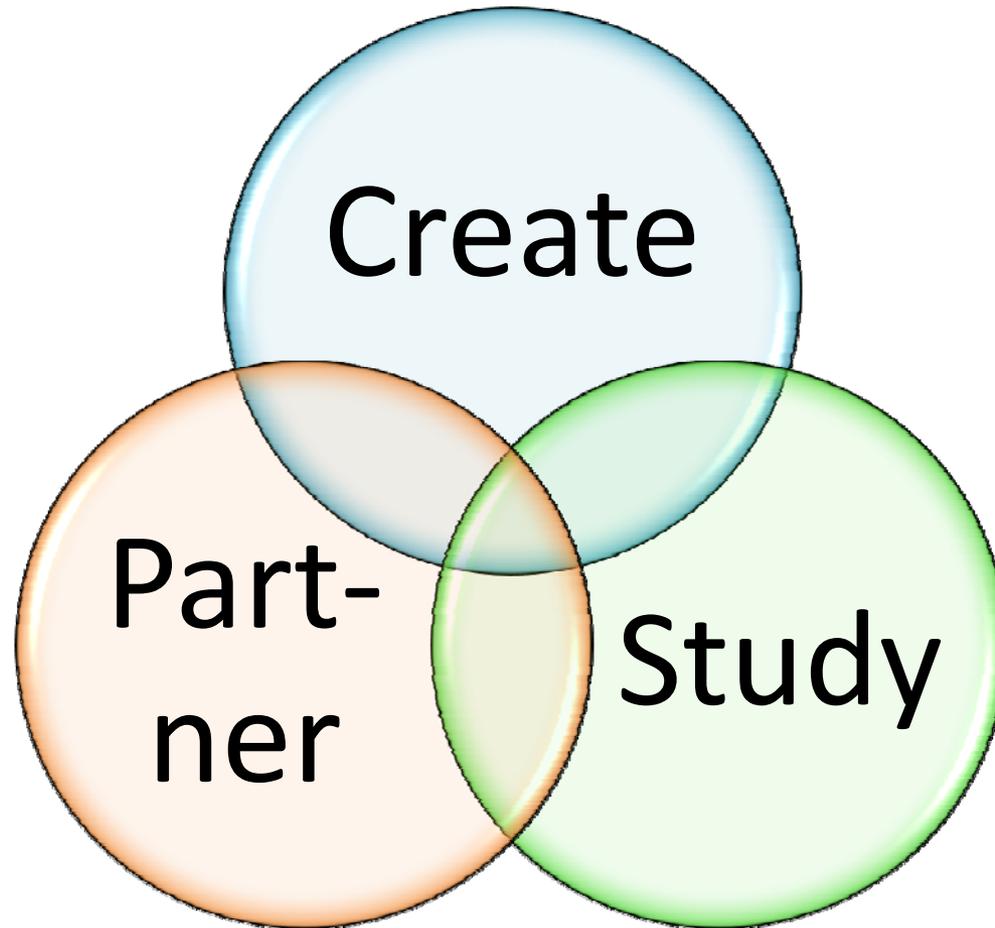




The Social, Behavioral, and Economic Sciences: Critical Dimensions of Innovation

Dr. Myron Gutmann, Assistant Director
Social, Behavioral, and Economic Sciences Directorate
National Science Foundation
May 17, 2010

SBE and Innovation: Three Roles



SBE in a Nutshell

- Annual budget of \$255 million
- Approximately 58% of federally funded basic research in SBE fields in academic institutions
- Mostly peer-reviewed grants to individuals & small groups – approximately 4800 proposals and 1200 awards in a typical year, including dissertation improvement grants
- Also provide funding to major surveys; collect data on the science and engineering enterprise
- Advisory Committee made up of external researchers



SBE Structure

- **Two research divisions:**

 - ***Behavioral & Cognitive Sciences***

 - Anthropology, Cognitive Neuroscience, Geography, Linguistics, Social Psychology, ...

 - ***Social & Economic Sciences***

 - Economics, Political Science, Sociology, Methods, Decision-Making, Law & Society, Science & society, ...

- **Science Resources Statistics**

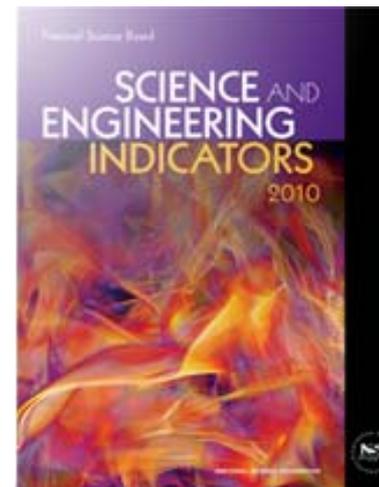
 - Official Statistics about science for the U.S.

- **Office of Multidisciplinary Activities**

 - Interdisciplinary & cross-Foundation activities



**PANEL STUDY OF
INCOME DYNAMICS**



SBE Priorities

- Innovation
- Learning, Thinking, Behavior
- Climate, Energy, People
- Cross-Cutting Approaches

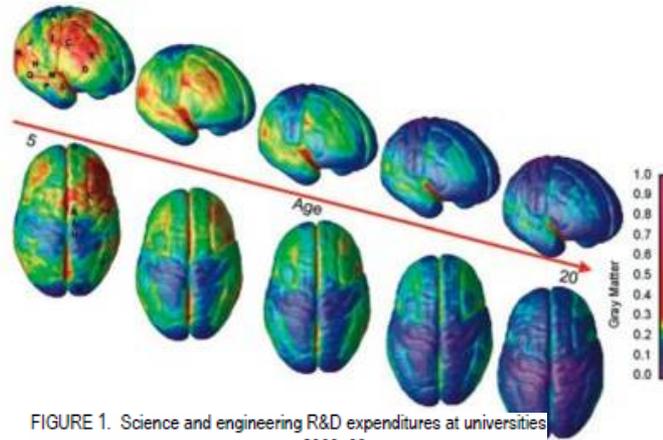
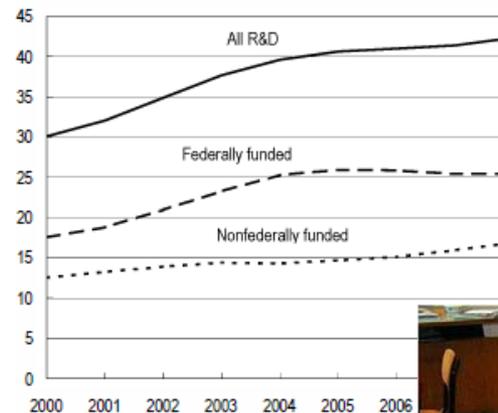


FIGURE 1. Science and engineering R&D expenditures at universities and colleges, by source of funds: FY 2000–08

Constant 2000 dollars (billions)



SOURCE: National Science Foundation, Division of Science Statistics, Survey of Research and Development Expenditure Universities and Colleges: FY 2008.



Learning, Thinking, Behavior

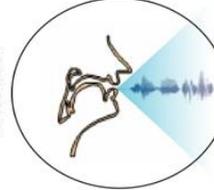
- Science of Learning Centers
- Cyber-Enabled Discovery & Innovation (CDI)
- Development and Learning Sciences
- Linguistic and Psychological Sciences

CELEST
studies natural intelligence in four ways

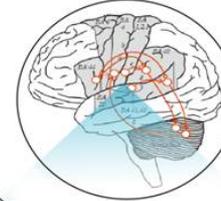
**An example:
Learning to speak**

CELEST speech models are being applied to speech synthesis and recognition

Technology

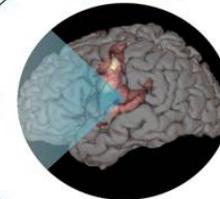


Models



A neural model of speech production has been developed by CELEST researchers

Experiments



Neuroimaging experiments test model predictions

CELEST

Education



CELEST speech models provide insights into speech learning in the classroom and home



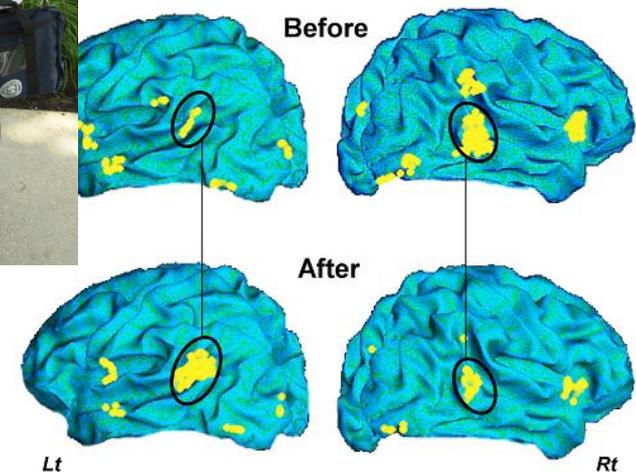
Climate, Energy, People

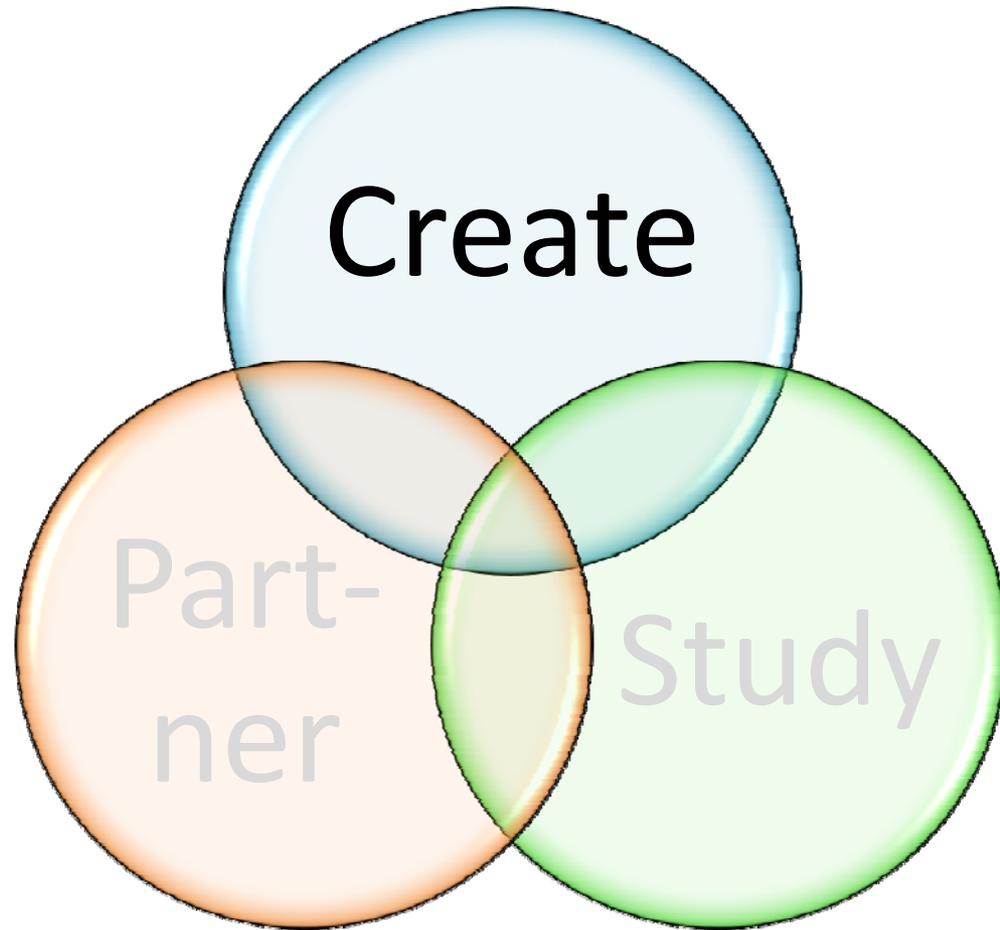
- Dynamics of Coupled Natural & Human Systems
- Broad-Based Climate programs – Waters just released
- Environment, Society, and the Economy
- Disaster Resilience for Rural Communities



Cross-Cutting Approaches

- Decision-making research
- Innovative Tools & Methods
- Geography & Spatial Sciences
- Methodology, Measurement, & Statistics
- Perception-Action-Cognition & Cognitive Neuroscience
- Archeology & Archeometry
- Empirical Implications of Theoretical Models





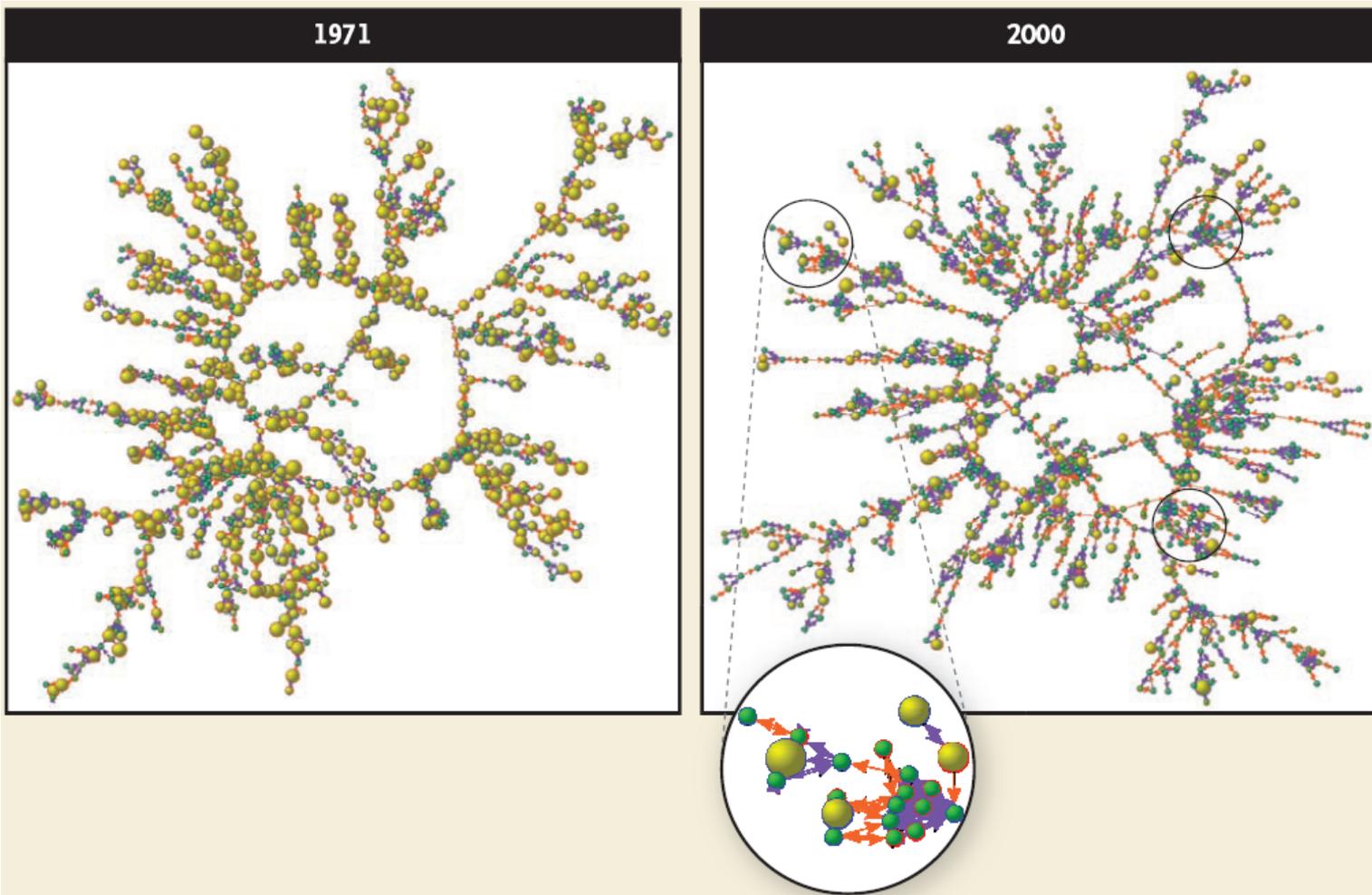
SBE Research

Elinor Ostrom, 2009
Nobel Laureate



Paul Torrens' agent-based models of crowd behavior used to design more effective evacuation plans





From “The Collective Dynamics of Smoking in a Large Social Network”

By Nicholas A. Christakis and James H. Fowler

New England Journal of Medicine 358:21 (May 22, 2008)

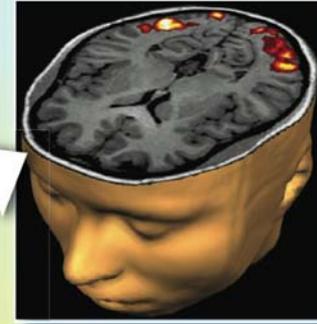


A New Science of Learning

Psychology



Neuroscience



**NEW
SCIENCE OF
LEARNING**

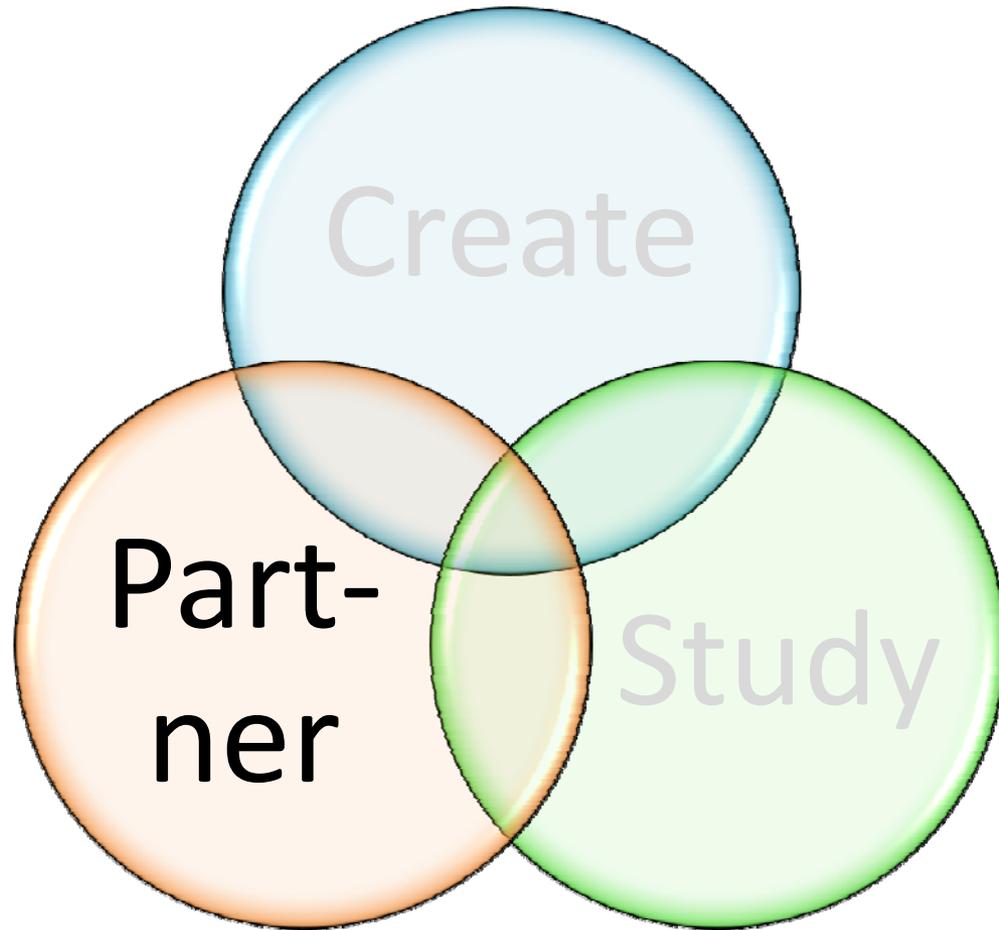


Machine Learning



Education





Cyber-based activities

- Cyber-enabled Discovery and Innovation
 - Complex systems; data-intensive science; virtual organizations
- Cyberinfrastructure
 - DataNet
 - PetaScale Applications
 - Virtual Organizations
- Computer and Information Science
 - Creative IT
 - Social and Computing Systems



Sustainability

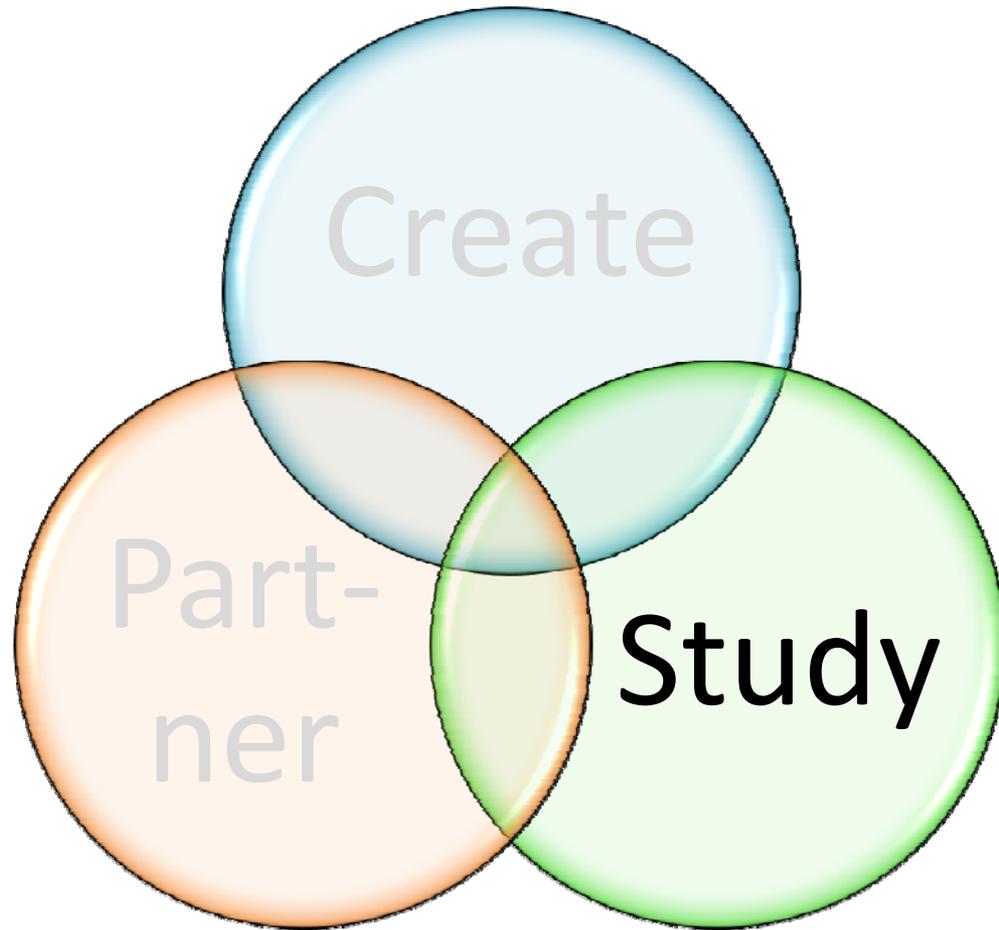
- Climate Research Investment
 - Water
 - Climate Modeling
- SBE-based
 - Decision Making Under Uncertainty
 - Coupled Natural and Human Systems
 - Urban Long-term Ecological Research Areas
 - Environment, Society, and Economics



Other Partnerships in SBE Office of the Assistant Director

- Human & Social Dimensions of Nanoscale Technology
- Learning Systems
- SBE Sciences in the Federal Arena
- International Partnerships





Science Resources Statistics

- Nation's primary source of data and analysis on the science & engineering enterprise
- Designs, supports, and directs about 11 periodic surveys, other data collections & research projects
 - Major surveys on innovation in business
- Produces 30 publications yearly
- Congressionally-mandated publications:
 - Science & Engineering Indicators
 - Women, Minorities, and Persons with Disabilities in Science and Engineering



SciSIP: Advance the Scientific Basis of Science & Innovation Policy

Understanding

develop usable
knowledge and theories

Measurement

improve and expand
science metrics, datasets
and analytical models
and tools

Community of Practice

cultivate a community
of practice focusing on
SciSIP across the
academy, the public
sector and industry



SciSIP Program

- Background & Status
 - Established 2005, \$8-10 million/year
 - Explicitly interdisciplinary
 - Designed to foster understanding, measurement, community of practice
 - Over 90 awards in four solicitations since 2007
 - Active engagement with Science of Science Policy Interagency group
- Approaches
 - Qualitative/ Case Studies – describe complex processes & formulate hypotheses
 - Quantitative and Statistical Methods – new datasets, models, tools
 - Computational approaches – process large amounts of data
 - Outstanding research in Economics, Sociology, Psychology, & Visualization, with broad interdisciplinary ties





Highlighted Researcher Comin, Diego

Newer technologies have been adopted faster than older ones. This acceleration in technology adoption has taken place over the two centuries covered by our data, and therefore started long before the digital revolution and the post-war globalization process...

[Read more](#)

[Next](#)

About SciSIP

The Science of Science & Innovation Policy (SciSIP) program was established at NSF in 2005 in response to a call from Dr. John Marburger III for a "specialist scholarly community" to study the science of science policy. The program has three major goals: advancing evidence based science and innovation policy decision making; building a scientific community to study science and innovation policy and leveraging the experience of other countries. A recent *Science* article highlights some of the issues addressed by SciSIP researchers.

[Read more](#)

Recent SciSIP Awards



- RAPID: The Impact of Stimulus Spending on...
- National Survey of College Graduates (NSCG...
- Redesign of the Survey of Research and Development...
- Economic Stimulus and Innovation Capacity...
- MOD: Transmission of Tacit Skills in East...

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Recent Research Findings



- The Twitter Effect: Why Sharing Knowledge Can Hurt...
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SciSIP Collaborations across NSF

- Co-funding with multiple Directorates, Divisions and Programs: SBE, OISE, MPS, CISE, EHR, ENG
- Discovery in a Research Portfolio
 - CISE/SBE Advisory Committee
 - 50 program officers/science assistants; 10 teams of Pis
 - Recommendations by November, 2010
- Partnership with Chemistry – Dear Colleague Letter to understanding investments in Chemistry



A Big Partnership: STAR METRICS

- Interagency partnership to develop metrics related to outcomes of science and technology investments - leadership from OSTP, NIH, NSF
- Bring together as partners
 - Agencies
 - Universities
 - Researchers in the science of science and innovation policy
- Make use of
 - Administrative data from the agencies and universities
 - Data enclave available to all partners
 - Public datasets on publications, patents, etc.
 - New mechanisms for describing and assessing investment portfolios



Thank you!

mgutmann@nsf.gov

