Perspectives on Funding & Policy for Team Science

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Funding for Team Science

...and here we have our data visualization team. This is Dave our pie chart specialist, Lenny in bar graphics, and Spence, our scatterplot designer.
Applying For A Grant
Key Gateways and Resources
How Does NSF Support Interdisciplinary Research?

- Solicited and unsolicited mechanisms:
  Grant Proposal Guide, Categories of Funding Opportunities
  - Solicited Interdisciplinary Programs
  - Areas of National Importance
  - Center Competitions
  - Education & Training
  - Workshops, Conferences, and Symposia

http://www.nsf.gov/pubs/policydocs/pappguide/nsf11001/pg_1.jsp#IC
Proposals proposal may be suitable for submission to and review by a single unsolicited core program, may be more appropriate for co-review by more than one program, or may extend beyond the scope of any current program (in which case it must be appropriate for NSF support).

Core programs, even if managed within a single NSF division and with scope within a discipline, often handle interdisciplinary proposals by co-reviewing, and possibly co-funding, with other appropriate programs.

http://www.nsf.gov/pubs/policydocs/pappguide/nsf11001/gpg_1.jsp#IB
Interdisciplinary Behavioral and Social Science Research (IBSS)

FOSTERING RESEARCH IN THE SOCIAL, BEHAVIORAL, AND ECONOMIC SCIENCES AT THE NATIONAL SCIENCE FOUNDATION IN THE NEXT DECADE

REBUILDING THE MOSAIC
Emphasis is placed on support for research that involves researchers from multiple disciplines, that integrates scientific theoretical approaches and methodologies from interdisciplinary fields, and that is likely to yield generalizable insights and information that will advance basic knowledge and capabilities across multiple disciplines.

Budget: Large $1M; Exploratory $250,000 & 2 yrs.

Four major cross-cutting research themes for which interdisciplinary research might be especially productive:

- Population change
- Sources of disparities
- Communication, language, and linguistics
- Technology, new media, and social networks

http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504832
Types of NIH Grant Mechanisms

- R03 – Small Research Grant
- R21 – Exploratory/Developmental Grant
- R01 – Research Grant
- **R24** – Resource Related Research Grants
- P01 – Research Program Projects
- **U01** – Cooperative Agreement Program Projects
- **U54** – Cooperative Agreement Research Centers
- SBIR/STTR – Technology Grants
- K-Awards NCI – Training Awards

[http://deainfo.nci.nih.gov/flash/awards.htm](http://deainfo.nci.nih.gov/flash/awards.htm)
Funding Opportunity Announcements (FOAs)

- FOAs may be known as program announcements, requests for applications, notices of funding availability, or solicitations
  - HHS Agencies have developed *Parent Announcements* (also known as “generic,” “unsolicited” or "investigator-initiated") for common grant mechanisms
    - Responding to such a Parent FOA ensures that the correct application package is used and enables NIH to receive the application from [www.Grants.gov](http://grants.nih.gov/grants/oer.htm)
    - This process does not prevent investigator-initiated, unsolicited research grant applications

- [http://grants.nih.gov/grants/oer.htm](http://grants.nih.gov/grants/oer.htm)
Types of FOAs

- **Program Announcement (PA/PAR):** Statement of ongoing research interest by Institute/Center
  - No set-aside monies (usually)
  - Investigator-initiated awards are now in response to a parent PA

- **Request for Applications (RFA):** Special research initiative
  - Set-aside monies and specially assembled review group
The Common Fund has been used to support a series of short term, exceptionally high impact, trans-NIH programs known collectively as the NIH Roadmap.

The portfolio of programs supported by the Common Fund continues to evolve to encompass a diverse set of trans-NIH programs.

http://commonfund.nih.gov
R01: Research Project Grants

- Traditional investigator-initiated grant providing support for discrete, specified research
  - If > $500K/year, need to request NIH Center for Scientific Review (CSR)/Institute Program Director pre-approval — submit request at least 8 weeks before submission deadline
  - Up to 5 years (usually 3–5 years)
Funding Announcements

- Physical Activity and Weight Control Interventions among Cancer Survivors: Effects on Biomarkers of Prognosis and Survival (R01)
  PAR-12-228

- Physical Activity and Weight Control Interventions among Cancer Survivors: Effects on Biomarkers of Prognosis and Survival Exploratory/Developmental (R21)
  PAR-12-229
NIH Revision Awards for Creating Virtual Consortium for Translational / Transdisciplinary Environmental Research
PAR -14-050 NIEHS

- To promote transdisciplinary collaborations and/or translational research efforts among basic (technology and mechanism oriented), clinical and population-based researchers and others with expertise relevant to environmental health, to come together around a particular environmental stressor(s) of interest.

- Support high-risk, high reward transdisciplinary research in areas where environmental factors are known or suspected to influence the development or progression of disease.

- Successful outcomes will likely contribute significantly to the program’s environmental health science field.
Explore the potential for precision medicine - an emerging approach that takes into account individual variability in genes, environment, and lifestyle - to promote health equity and reduce health disparities.

Priorities include:

◦ 1) development of new tools and analytic methods for integrating patient data with information about contextual factors acting at the community or population level to influence health;

◦ 2) development of pharmacogenomic and other precision medicine tools to identify critical biomarkers for disease progression and drug responses in diverse populations;

◦ 3) translation of pharmacogenomic discoveries into effective treatment or clinical practice; and

◦ 4) investigation of facilitators and barriers to implementing precision medicine approaches in disadvantaged populations.

R24: Resource-Related Research Projects

- Used in a wide variety of ways to provide resources for problems where multiple expertise is needed to focus on a single complex problem in biomedical research or to enhance research infrastructure.

- Characteristics:
  - Institute Specific
  - Only in response to FOA
Collaborative Interdisciplinary Team Science in NIDDK Research Areas (R24)

- PAR-13-305
- To encourage applications that assemble an interdisciplinary, collaborative team of creative, independent, and funded investigators to address a complex and important problem relevant to the mission of NIDDK (basic, translational, clinical) (1 project/1 team).
- The team science approach encouraged by this FOA could be used to generate a research resource, which may include discovery-based or hypothesis-generative approaches, to advance the relevant area of biomedical research.
Support an integrated, multi-project research approach involving a number of independent investigators who share knowledge and common resources and have a shared, well-defined research program goal.

There is a defined central research focus involving several disciplines or several aspects of one discipline (Team Science).

Typically has coordinated research theme, and three to four primary projects that are interconnected.
PENN TREC Challenges in Cancer Survivors

**Recurrence risk**

**Project 1:**
Mouse Model Study of Exercise, Weight Loss, and Recurrence (Chodosh)

**Project 2:**
Human Clinical Trial of Exercise & Weight Loss (Schmitz) in Aim: Improve Recurrence Biomarkers

**Project 3:**
Cost Effectiveness Analysis of Exercise and Weight loss for Breast Cancer Survivors with Lymphedema (Schwartz)

**Persistent Adverse Tx Effects**

**Outreach & Dissemination Activities**
Tips for P01 Success

- Contact program staff well in advance of submission (9 months).
- Get budget approval prior to submission (required).
- Some IC’s will require a presentation and discussion between Lead PI/team and key NIH staff prior to submission.
- Strength of Structure & Strength of Science
  - Is the sum worth more than the individual parts?
- Clarity of function

P30: Center Core Grants

- To support shared resources and facilities for categorical research by a number of investigators from different disciplines who provide a multidisciplinary approach to a joint research effort or from the same discipline who focus on a common research problem.

- The core grant is integrated with the center's component projects or program projects, though funded independently from them.
Cancer Center Support Grants (CCSGs) for NCI-designated Cancer Centers (P30) PAR-13-386

- P30 Cancer Center Support Grants for NCI-designated cancer centers.
- The objectives of the NCI Centers Program is to foster highly interactive cancer research (Team Science).
- To capitalize on all institutional cancer research capabilities, integrating meritorious programs in laboratory, clinical, and population research into a single transdisciplinary research enterprise across all institutional boundaries.
P50: Specialized Center Grants

- To support any part of the full range of research and development from very basic to clinical
- May involve ancillary supportive activities such as protracted patient care necessary to the primary research or R&D effort.
- The spectrum of activities comprises a multidisciplinary attack on a specific disease entity or biomedical problem area.
- Receive continuous attention from staff funding IC.
- Centers may serve as regional or national resources for special research purposes.
Support discrete, specified, circumscribed projects performed by named investigators in an area representing their specific interests and competencies.

Used when substantial programmatic involvement is anticipated between the awarding Institute and Center.

One of many types of cooperative agreements

No specific dollar limit unless specified in FOA

Transdisciplinary Research on Energetics and Cancer (TREC) Centers (U54) Grant
State & Community Tobacco Control (SCTC) Research Initiative (U01) Grants.
To promote a physical sciences perspective of cancer and foster the convergence of physical science and cancer research by, forming transdisciplinary teams of physical scientists (e.g., engineers, chemists, computer scientists, mathematicians, physicists) and cancer researchers (e.g., cancer biologists, oncologists, pathologists) to work closely together to advance our understanding of cancer biology and oncology.

To support transdisciplinary research that: (1) establishes a physical sciences perspective within the cancer research community; (2) facilitates team science and field convergence at the intersection of physical sciences and cancer research; and (3) collectively tests physical sciences-based experimental and theoretical concepts of cancer and promotes innovative solutions to address outstanding questions in cancer research.
National Center for Advancing Translational Science (NCATS)

- Supports collaborative research teams that develop, demonstrate and disseminate innovative methods and technologies to advance basic discoveries into effective health solutions for patients. Programs cover a broad range of diseases and conditions.

- Currently 62 medical institutions in 31 states & DC.

- Clinical and Translational Science Awards
  - [ncats.nih.gov/ctsa.html](http://ncats.nih.gov/ctsa.html)
NIH for Small Business Technology Transfer Grant Applications (Parent STTR [R41/R42])

- Intended to stimulate scientific and technological innovation through cooperative research/research and development (R/R&D) carried out between small business concerns (SBCs) and research institutions (RIs)
- Fosters technology transfer between SBCs and RIs
- Assists the small business and research communities in commercializing innovative technologies

- Three-phase structure:
  - I - Feasibility study to establish scientific/technical merit of the proposed R/R&D efforts (generally, 1 year; $150,000)
  - II - Full R/R&D efforts initiated in Phase I (generally 2 years; $1,000,000)
  - III - Commercialization stage (cannot use STTR funds)
- Eligibility limited to U.S. small business concerns

- See parent FOA: PA-14-072
NIH, CDC, FDA and ACF for Small Business Innovation Research Grant Applications (Parent SBIR [R43/R44])

- Intended to stimulate technological innovation in the private sector by supporting research or research and development (R/R&D) for for-profit institutions for ideas that have potential for commercialization

- Assists the small business research community in commercializing innovative technologies

- Three-phase structure:
  - I - Feasibility study to establish scientific/technical merit of the proposed R/R&D efforts (generally, 6 months; $150,000)
  - II - Full research or R&D efforts initiated in Phase I (generally 2 years; $1,000,000)
  - III - Commercialization stage (cannot use SBIR funds)

- Eligibility limited to U.S. small business concerns

- See parent FOA: PA-14-071
The Team Science Toolkit is an interactive website that provides resources to help users support, engage in, and study team-based research.
The Toolkit is A “One-Stop Shop”

- Consolidates information on team-based research and the Science of Team Science (SciTS) field in one accessible location
- Integrates resources from multiple disciplines and fields, such as psychology, management, public health and communications
- Includes a user-generated set of resources, such as practical tools and strategies, measures and metrics, bibliographic citations, and publications
- Includes sections written or coordinated by the NCI, such as introductions to team-based research and the SciTS field, key resources, and expert blogs
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<th>If you are:</th>
<th>And you want to:</th>
<th>Use the Toolkit to find resources such as:</th>
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| A leader or member of a science team | Find practical tools and strategies to help support successful team science | • Publications on effective team science approaches  
• Pre–collaboration discussion guides addressing issues such as data ownership, authorship, and patents  
• Strategies for team communication and data sharing  
• Training resources to build team science competencies |
| A team science evaluator or researcher | Evaluate or study team science processes, outcomes, and contextual influences | • Survey instruments and interview guides  
• Measures, metrics and algorithms  
• Reliability, validity and scoring methods |
| An administrator at an academic institution, business, or other organization | Support team science approaches and scholarship at your institution | • Promotion and tenure policies recognizing team science  
• Collaboration techniques to bridge departments and organizations |
| A funding agency official | Provide support for team science | • Funding announcements  
• Protocols for data sharing and co–authorship |
Team Science:
Lessons Learned from NCI
Accelerating Scientific Progress through Transdisciplinary Team Science

Behavioral Research Program, Division of Cancer Control and Population Sciences, National Cancer Institute

Support of transdisciplinary science to study the initiation, conclusion, and maintenance of actions to prevent, detect, or ameliorate the effects of cancer

Transdisciplinary Research on Energetics and Cancer Centers (TREC) U54 - $74,811,868

- Funded in two phases, TREC fosters transdisciplinary collaborations across multiple disciplines to address the complex relationships between obesity, energy balance, and cancer.
- Areas of Phase 2 investment (2011-2016): Biological mechanisms of obesity and cancer; Integration of individual (biology, genetics) and social-environmental approaches to explain and modify energy balance-related behaviors; Expansion of translational research focus with greater emphasis on cancer survivors; and Development and use of validated measures and theoretical constructs.

Centers of Excellence in Cancer Communication Research (CECCR) P50 - $83,880,445

- CECGR is a broad initiative that supports research and outreach aimed at increasing the knowledge about, tools for, access to, and use of cancer communications by the public, patients, survivors, and health professionals.
- Areas of future investment include: Clinical Communication and Health Information Technology; Uncertainty and Risk Communication in Cancer Prevention, Screening, Treatment, Prognosis and Mortality, and Media Effects in the Changing Communication Landscape.

543 CECGR publications in peer-reviewed journals
1 CECGR-specific journal supplement (Patient Education and Counseling)

Communicating Science

- Team Science Initiative

Centers for Population Health and Health Disparities (CPHHD) P50 - $66,298,321

- CPHHD promotes transdisciplinary research in the area of health inequities with the purpose of contributing directly to improved health outcomes and quality of life for populations with a higher disease burden. NCI is currently partnering with NHLBI and OESSR on this initiative.
- The CPHHD program responds to a strategic NIH priority to address disparities and inequities in the prevalence and outcomes of several diseases.

Transdisciplinary Tobacco Use Research Centers (TTURC) P50 - $68,995,753

- The TTURC initiative was a collaboration between NCI, NIDA, and NIAAA to address the public health impact of tobacco use and the scientific need for integrative transdisciplinary research across the full spectrum of basic and applied research on tobacco use and control.
- The investment in team science for tobacco control research continues. Since 2004, three centers (former TTURC) have sustained funding as either P01s or P50s with an NCI investment of $30,115,061 through 2014.
NCI State & Community Tobacco Control (SCTC) Research Initiative: Team Science bet. researchers & practice partners

FY2011: 7 Sites; 1 Coordinating Cntr 5-yr. U01s -$46M.

# of Ties with Affiliated Partners= **102**
Interagency partnership
- $53 million awarded in FY13
- 14 TCORS (7 at NCI)

TCORS made up of scientists with a broad range of expertise

Topical Working groups: e.g., Measures, training, lab methods, biomarkers, products, and health communication
Team Science: Lessons Learned from TREC
Reported Challenges in Transdisciplinary Collaboration

- Conceptual and Scientific
- Incentive, Recognition Systems & Academic Norms
- Different Disciplinary Cultures Among Collaborators
- Management
Challenges

- **Conceptual and scientific**
  - Forced to work outside of “comfort zone”
  - Lack of clarity about what TD is and how to get there
  - TD research is more complex – more variables, assays, larger sample sizes and complex endpoints

- **Need to learn a new “culture”**
  - Methods; terminology and work styles

Challenges

- **Management challenges**
  - More scientific complexity but research is more time consuming and expensive
  - Large teams can be innovative but more complex to manage
  - Complex data harmonization

Challenges

- Academic incentive and recognition systems slow to evolve
  - Lack of systems for cross-departmental, cross school collaborations.
  - P & T review may not adequately credit TS
  - Unclear where to publish TS, challenges with funding
  - Challenges with TD research influence across areas of career advancement & review.

Impact of Participating in Transdisciplinary Research

Adoption of TD Ethic, Approaches

New Boundary-Crossing Collaborations

Career Development Advancement

Scientific Impact

Institutional Culture Change, Resource Development
Factors for Success

- **Create a TD Ethic**
  - Build awareness of strengths and weaknesses of disciplines
  - Recognize the scientific value added
  - Openness to exploring other areas of science

- **Team Processes**
  - Identify shared goals
  - Build trust
  - Develop mutual understanding and partnerships

Impact of TREC Participation

Reinforced TD ethic and approach, decrease in specialization
- Willingness to continue learning in other areas of science and apply concepts, theories and methods from other disciplines
- “Transformed” their attitudes about TD research, their research approach
- Plans to use TD approach in future research

Established new boundary-crossing collaborations

Career development and advancement

Greater support for TD research at institution: culture and resources
- Cross-disciplinary hiring, new courses in energetics and cancer
- New infrastructure for teamwork
- Inspired TD research elsewhere at institution, especially at the cancer centers
Team Science: Lessons Learned from SCTC
Perceived Value of SCTC Network

- Explicitly designed to facilitate collaboration/team science
- Encouraged deeper engagement with community
- Required scientists to think beyond science to policy and practice
- Flexible and responsive to fast changing environment
- Not a narrow band of substantive topics
- Engaged the top scientists in the field
- Engaged critical state and community partners
What Promoted Collaboration

- Collaborative Developmental Projects
- Face-to-face interactions at bi-annual meetings
- Attending to both the art and science of team science
  - Structure and culture
- Facilitated communication
- The U01 funding structure
- A pre-existing commitment to working with partners in policy and program arena
What Inhibited Collaboration

- Time and resources
- A sense of collaboration being forced for the sake of collaboration
  - Must have a legitimate, practical, rational reason
- Bureaucracy and red tape of organizations
- Lack of adequate transparency and info exchange
- Inadequately resourced Coordinating Center
  - Lack of well-designed Website (for internal purposes)
- Negligible concerns over intellectual property
What Components Helped the Most?

- Collaborative Developmental Projects
- Bi-annual Team Meetings
- Monthly conference calls that were substantive and well facilitated
- Working Groups, but only those that had a clearly defined objective
  - Development of STARS as unique success story
    - Standardized Tobacco Assessment for Retail Settings
What Components Did Not Help as Expected?

- Working Groups, in general

- Monthly conference calls that were not perceived to be substantive and/or facilitated – (salient in early years)

- The Coordinating Center
  - Under-resourced
  - Funded as a separate grantee rather than as contract
What funding agencies can do foster Team Science research programs

- Make expectations of collaboration clear within RFA
- Consider the U01 mechanism, if applicable
- Assign significant scoring weight to team science & collaboration sections of application
- Fully fund and structure Coordinating Center to enable brokering, networking
  - Consider funding as contract rather than grant
  - Consider separating logistical support from team science support
  - Think about needed IT infrastructure carefully in advance, such as websites and/or communication and data sharing tools to be used by the Teams.
**Seminal Papers**

**TTURCs:**


**TREC:**

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