Tools You Can Use:

Practical Team Science Guidance

Holly J. Falk-Krzesinski, PhD
Vice President, Strategic Alliances, Global Academic Relations

New Jersey ACRL Chapter

ELSEVIER

Fostering Research Success: Getting Published, Collaborating, and Winning Grants
November 17, 2015

INTRODUCTION

"Team research, especially interdisciplinary research, is characterized by synergies among experts that can transform both scholars and scholarship“

- *John Cacioppo, PhD, the Tiffany and Margaret Blake Distinguished Service Professor in Psychology, The University of Chicago, from the Arete Initiative website http://arete.uchicago.edu/ (2010)*

ELSEVIER

Brief Bio

- Research Information/Publishing (3+ yrs)
  - Vice President, Strategic Alliances, Global Academic Relations, Elsevier
- Academia (20+ yrs)
  - Adjunct Lecturer, School of Professional Studies, Philanthropy & Nonprofit Program, Northwestern University
  - Senior Lecturer and Research Assistant Professor, Northwestern University
    - Assistant Chair, Molecular Biosciences; Associate Director, IBiS Graduate Program (Arts & Sci), Northwestern University and Administrative Director for multiple NIH T32's
    - Director, Office of Research Development (Central Admin)
    - Director, Research Training Program, Children's Memorial Research Center
    - Director, Research Team Support & Development, NUCATS Institute, Northwestern University (Med Sch)
    - Director/Co-director
      - BioOpportunities, BioSurvival Skills, Pathway to the Professoriate
      - Navigating the Professoriate, Chicago Collaboration for Women in STEM
  - Undergrad, PhD, Postdoc training
- Pharma (2.5 yrs)
  - Anti-infective research, Abbott Laboratories
- Other Nonprofit Experience (6+ yrs)
  - Editor-in-Chief, AWIS Magazine
  - Founding President, National Organization of Research Development Professionals (NORDP)

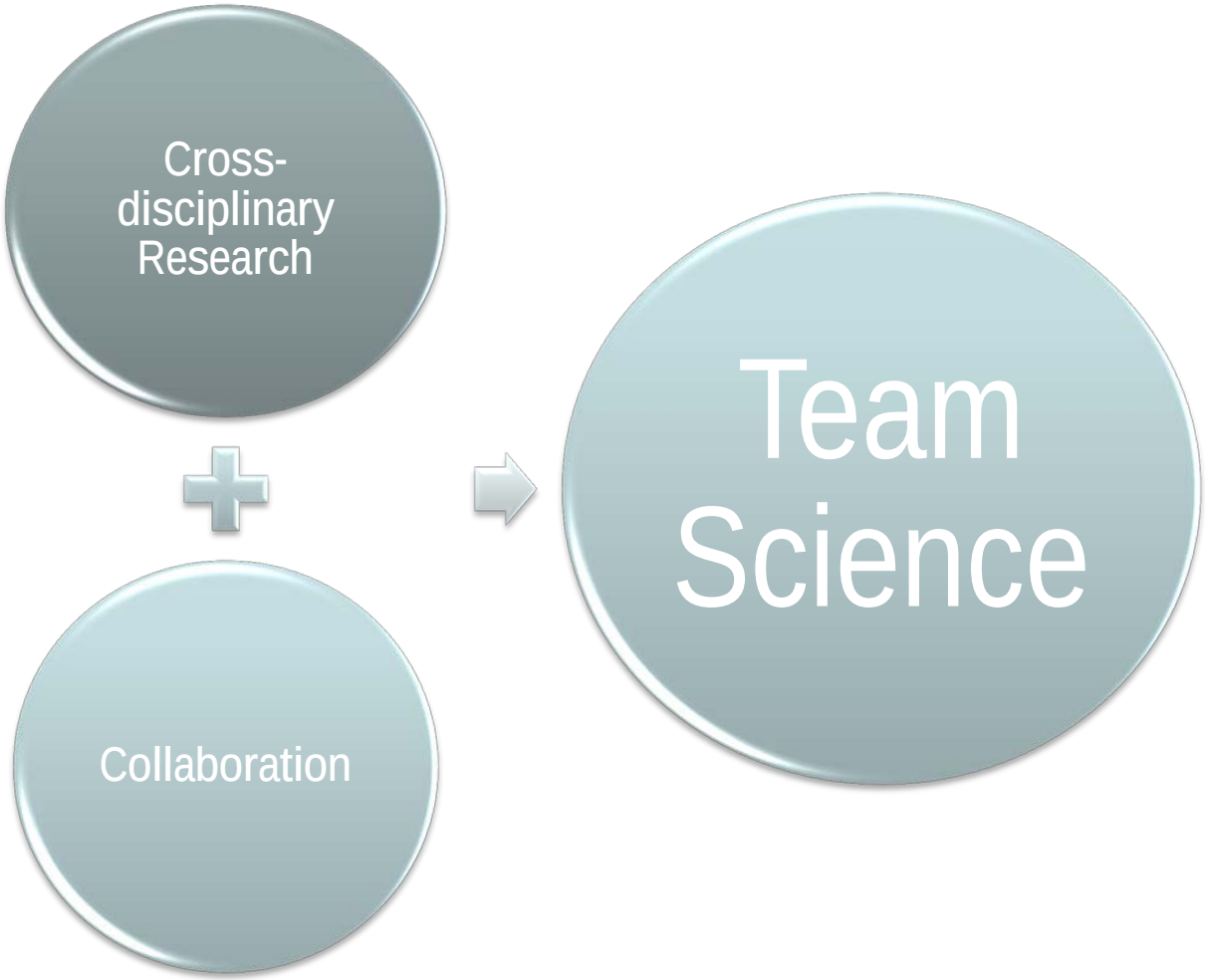
ELSEVIER

Collaboration, Networking and Teams

- Connecting researchers and resources in pursuit of large collaborative projects
- Compiled a 1.9K+ reference Team Science resource library
- Published primary research findings that inform effective collaboration, especially for science teams
- Developed and taught one of the first-ever Team Science graduate courses, co-developed an online Team Science course
- Chaired the Science of Team Science Conference for its first 3 years
- Team science consultant for almost two dozen US universities
- Involved with the US National Academies NRC team science report; UK The Academy of Medical Sciences team science initiative

ELSEVIER

What is Team Science?



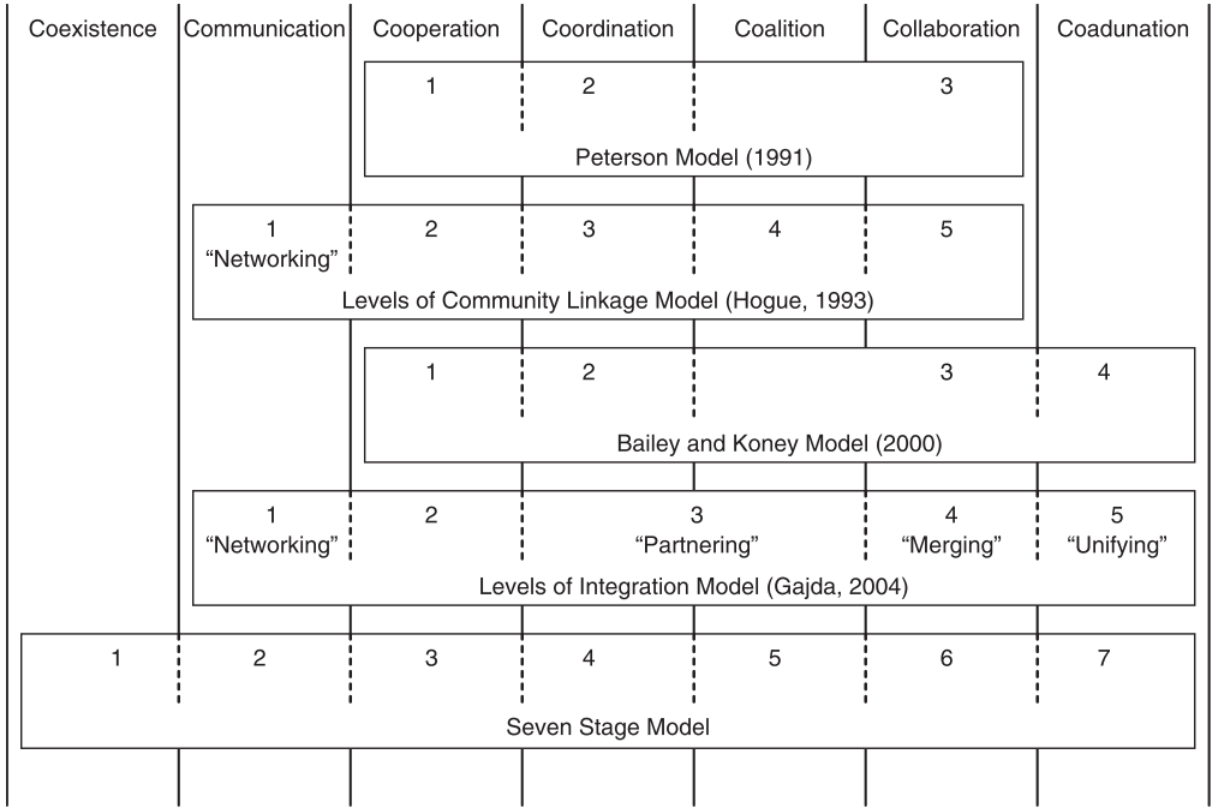
Cross-disciplinarity

- (Uni)**Disciplinary** research
- Three **Cross-disciplinary** research orientations
  - Combine or integrate from more than one field
    - Concepts, Methods, and Theories
  - ***Multi*disciplinary**
    - Independent, Sequential, Divisional
    - Exchange
  - ***Inter*disciplinary**
    - Joint, Interactive, Partnership
    - Dialogue, Hybridization, Complementary
  - ***Trans*disciplinary**
    - Integrative, Interdependence, Emergence
    - Reciprocity, Discourse, Share Vocabulary, Extends

Figures are from a licensed clip art library

Collaboration

Figure 1
Stage Models of Collaboration



Frey, B.B., Lohmeier, J.H., Lee, S.W., and Tollefson, N. (2006). Measuring collaboration among grant partners. Am. J. Eval. 27, 383–392.

Translating Science to Practice

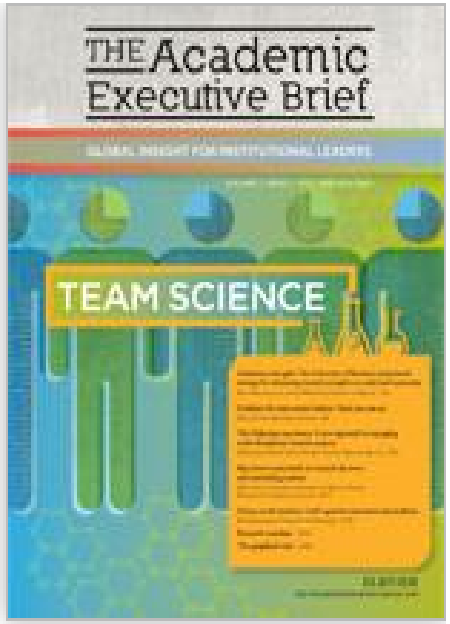
- There is an increased demand for team science initiatives in academia and by external funding agencies
- Coordination costs mean that team science takes *more* time, at least proximally; distal payoff in terms of acceleration
- Imperative that we <u>understand</u> the most effective practices for productive cross-disciplinary collaboration and team science
- Then train individual investigators, institutional leaders, and funders to <u>employ</u> them

ELSEVIER

Elsevier's Academic Executive Brief

TEAM SCIENCE
Volume 2, Issue 2 – 2012

In our new issue, academic leaders around the globe share their knowledge of and experience with team science. Authors from the United States, Germany, Malaysia, and India explore team science in terms of institutional and national influence, team science tools and leadership, team formation and research networking systems.



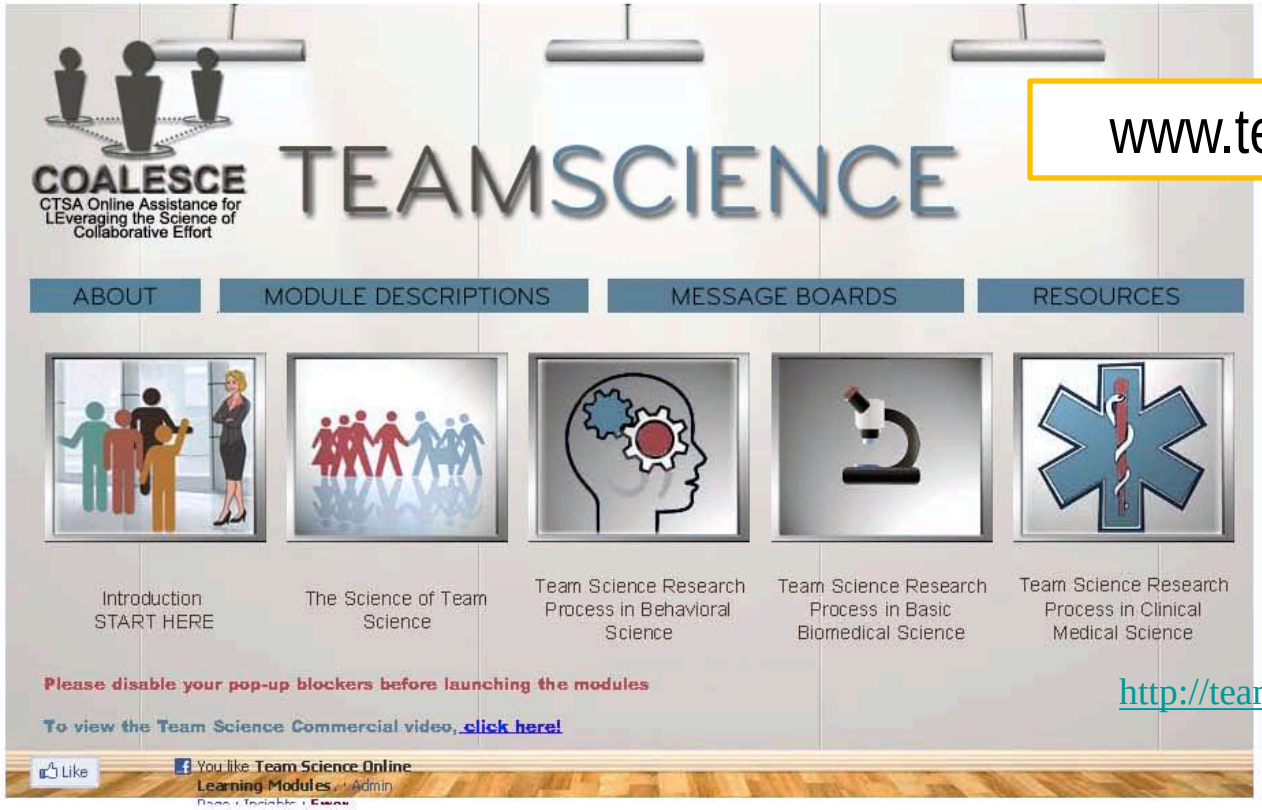
DOWNLOAD PDF

http://academicexecutives.elsevier.com/volume-2-issue-2-2012

ELSEVIER

TeamScience.net

Team Science Online Learning Modules



www.teamscience.net

http://teamscience.net/intro/index.html

NUCATS
CLINICAL AND TRANSLATIONAL SCIENCES INSTITUTE

Supported in part by: CTSA grant 3UL1RR025741 Multidisciplinary Clinical and Translational Science Program (PI: Philip Greenland) and National Library of Medicine contract N01-LM-6-3512 from the Office of Behavioral & Social Sciences Research, (PI: Bonnie Spring)

NORTHWESTERN UNIVERSITY

ELSEVIER

References: Hesse, B.W. (2011). COALESCE (CTSA Online Assistance for Leveraging the Science of Collaborative Effort). JAMA: The Journal of the American Medical Association *306*, 1925-1926.

Portable Team Science Training

Case Study Approach:

- Kong, H.H., and Segre, J.A. (2010). Bridging the Translational Research Gap: A Successful Partnership Involving a Physician and a Basic Scientist. J Invest Dermatol *130*, 1478-1480
- What was the nature/impetus for the collaboration?
- What factors helped the team build trust?
- What factors threatened that trust?
- How did the team use communication effectively?
- What communication issues were problematic for the team?
- How did the team manage conflict?
- What role, if any, do power and hierarchical relationships play in this case?
- What strategies did the team employ to share credit?

ELSEVIER

Toolbox Project

The Toolbox Project[1,2] Collaborative Communication Workshop provides a philosophical yet practical enhancement to cross-disciplinary, collaborative science. Rooted in philosophical analysis, the Toolbox workshop enables investigators, research development professionals, project managers, and collaborators to engage in a structured dialogue about their research assumptions and cross-disciplinary collaboration. This yields both self-awareness and mutual understanding, supplying individuals with the robust foundation needed for effective collaborative research. Led by Toolbox Project Facilitators, Workshop participants will engage in small group discussion and share respective views in response to a number of probing statements about science motivation, methodology, confirmation, objectivity, values, and reductionism.

[1]*Eigenbrode, S.D., O'Rourke, M., Wulfhorst, J.D., Althoff, D.M., Goldberg, C.S., Merrill, K., Morse, W., Nielsen-Pincus, M.A.X., Stephens, J., Winowiecki, L., et al. (2007). Employing Philosophical Dialogue in Collaborative Science. Bioscience 57, 55-64.*
[2]*Crowley, S., Eigenbrode, S.D., O'Rourke, M., and Wulfhorst, J.D. (2010). Cross-disciplinary localization: A philosophical approach. MultiLingual, September, 1-4.*

ELSEVIER

Toolbox Questionnaire

Philosophical domain and issue	Core question	Probing Statements
	Epistemology	
Motivation	Does the principal value of research stem from its applicability for solving problems or its potential for making basic discoveries?	1. Applied research is more important to me than basic research. *Disagree* 1 2 3 4 5 *Agree* 2. Cross-disciplinary, collaborative research is better suited to addressing applied questions than basic questions. *Disagree* 1 2 3 4 5 *Agree* 3. My research primarily addresses basic questions. *Disagree* 1 2 3 4 5 *Agree* 4. The importance of our project stems from its applied aspects. *Disagree* 1 2 3 4 5 *Agree* 5. The members of this team share similar views concerning aspects of basic and applied research. *Disagree* 1 2 3 4 5 *Agree*

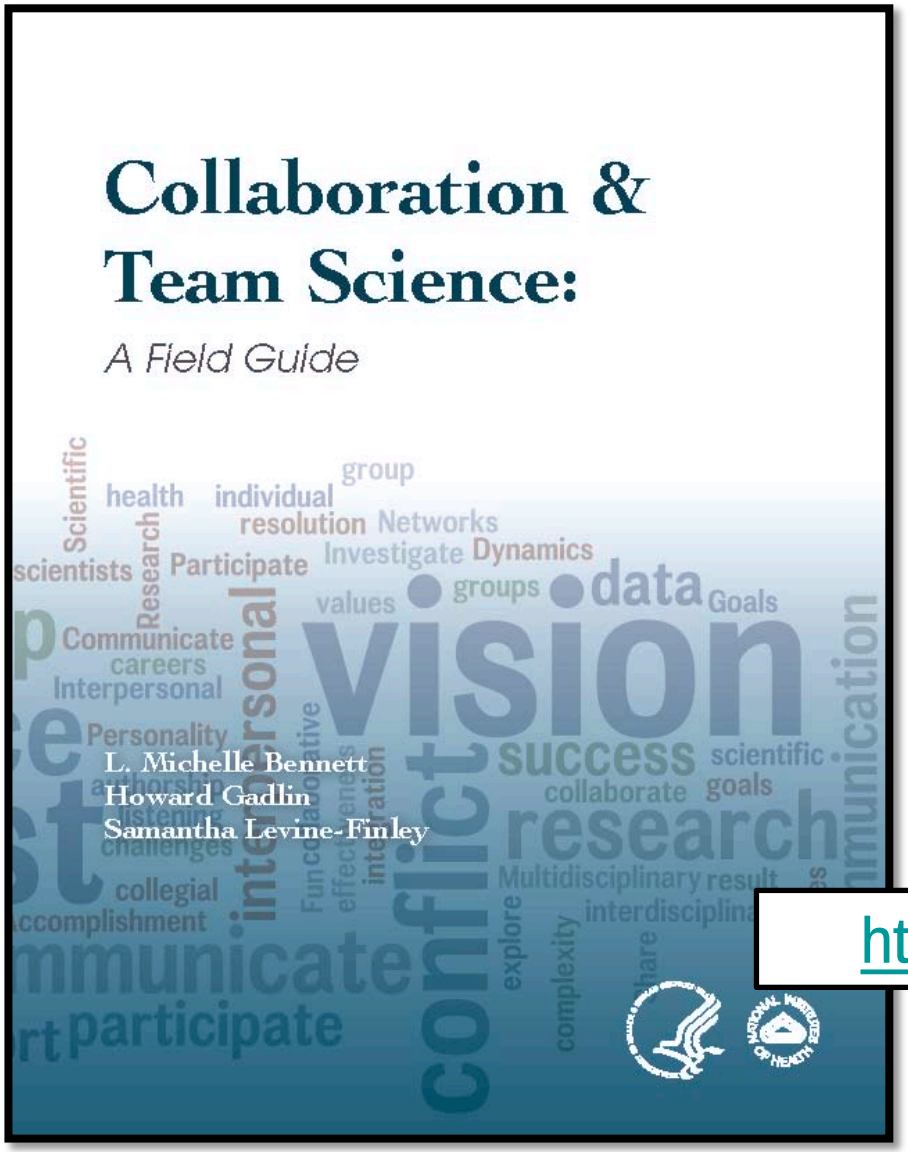
Collaboration Readiness

- On-line diagnostic survey for geographically distributed collaborations. The survey probes factors that may strengthen or weaken the collaboration. The Wizard provides both personal and project-level reports to help build successful and productive collaborative projects.

http://hana.ics.uci.edu/wizard/index.php

ELSEVIER

A Field Guide/Partner Agreement



- Overall Goals & Vision
- Who Will Do What
- Sharing/Storing Reagents & Data
- Authorship, Credit
- Contingencies & Communicating
- Conflict of Interest

http://teamscience.nih.gov

See also Bennett, L.M., and Gadlin, H. (2012). Collaboration and Team Science: From Theory to Practice. J Invest Med 60, 768-775

ELSEVIER

Team Science Toolkit

National Cancer Institute

at the National Institutes of Health | www.cancer.gov

Team Science Toolkit

An interactive website to help you support, conduct and study team-based research.

Home | About Team Science | About the Toolkit | Discover | Contribute | Connect | News & Events | About Us

Discover what resources are available...

"The Toolkit provides a wealth of resources for team scientists, including practical tools to use with your colleagues, such as team assessment guides and training resources."

—Holly Falk-Krzesinski, Vice President, Global Academic & Research Relations, Elsevier

Login | Register

Discover what resources are available.

Search for a keyword | Search

OR

Advanced Search

Browse by type of resource or goal | Browse

Contribute new resources to the Toolkit.

Share your knowledge by uploading tools and information about the practice or study of team science.

Connect to colleagues across disciplines.

Join expert discussions on the blog, add your name to the directory, or stay up-to-date on News and Events.

What Users Are Saying »

Recently Added Resources

- New Directions in Assessing Individuals and G...
- Finding the Needle in the Haystack: A Public ...
- The Individual and Scholarly Networks -- Virt...

The Toolkit currently includes **523** resources.

Resources

Tools

Measures

Bibliography

Connections

Blog

Expert Directory

Listserv

Email this page

www.teamsciencetoolkit.cancer.gov

ELSEVIER

SciTS Listserv

- The Science of Team Science (SciTS) listserv facilitates conversation among individuals who are engaged in, studying, or managing team science, in the US and internationally. The listserv is maintained collaboratively by the SciTS Team at the National Cancer Institute, Division of Cancer Control and Population Sciences, Behavioral Research Program (http://cancercontrol.cancer.gov/brp/scienceteam) at the NIH.
  - TO SUBSCRIBE: Send an email with a blank subject line to: listserv@list.nih.gov. The message body should read: subscribe SciTSlist [your full name]. Please do not include the brackets. For example, for Robin Smith to subscribe, the message would read: subscribe SciTSlist Robin Smith. You will receive a confirmation email.
  - TO POST TO THE LISTSERV: Send an email to SciTSlist@list.nih.gov. Any subscriber may post to the list.
  - TO VIEW THE ARCHIVES: To view the archives of all previous postings, go to: http://list.nih.gov/archives/SciTSlist.html
  - TO RECEIVE MESSAGES IN A DAILY DIGEST: The default setting sends you each message as it is posted to the listserv. To receive one daily digest, instead, go to: http://list.nih.gov/cgi-bin/wa.exe?SUBED1=SciTSlist&A=1 and select “digest” as your subscription type.
  - TECHNICAL PROBLEMS WITH YOUR SUBSCRIPTION? Contact the list administrator, Judy Kuan, at: kuanj@mail.nih.gov. Please be sure to state that your email is in reference to the SciTS listserv.

ELSEVIER

Levels of Collaboration Survey

- Measuring Collaboration Among Grant Partners
  - Evaluate collaboration and communication
  - Levels of Collaboration Scale
  - Visually display results of collaboration

Frey, B.B., Lohmeier, J.H., Lee, S.W., and Tollefson, N. (2006). Measuring collaboration among grant partners. American Journal of Evaluation *27, 383-392.*

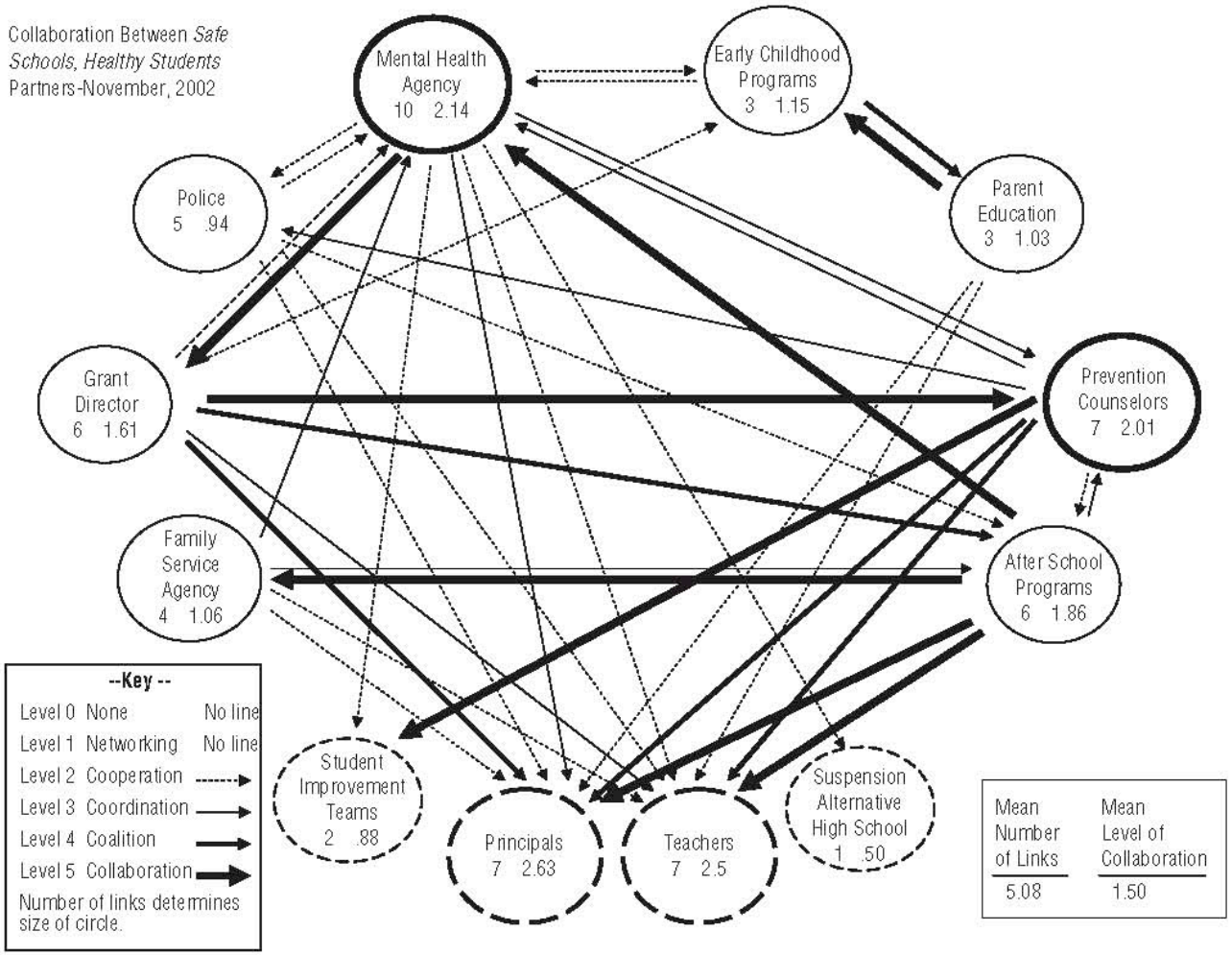
This form is designed for those who work in one of the organizations or programs that are partners in the *Safe Schools, Healthy Students* initiative. Please review these descriptions of different levels of collaboration.

- On the response section at the bottom of the page, please circle the name of the organization or group with which you are associated.
- Using the scale provided, please indicate the extent to which you currently interact with each other partner. (Skip your own row.)

	Five Levels of Collaboration and Their Characteristics				
	Networking 1	Cooperation 2	Coordination 3	Coalition 4	Collaboration 5
Relationship Characteristics	-Aware of organization -Loosely defined roles -Little communication -All decisions are made independently	-Provide information to each other - Somewhat defined roles -Formal communication -All decisions are made independently	-Share information and resources -Defined roles -Frequent communication -Some shared decision making	-Share ideas -Share resources -Frequent and prioritized communication -All members have a vote in decision making	-Members belong to one system -Frequent communication is characterized by mutual trust -Consensus is reached on all decisions

Safe Schools, Healthy Students Partners	No Interaction at All	Networking	Cooperation	Coordination	Coalition	Collaboration
Mental Health Agency	0	1	2	3	4	5
Early Childhood Programs	0	1	2	3	4	5
Parent Education Program	0	1	2	3	4	5
School District Prevention Counselors	0	1	2	3	4	5
After School Programs Director	0	1	2	3	4	5
Student Improvement Teams	0	1	2	3	4	5
Principals	0	1	2	3	4	5
Teachers	0	1	2	3	4	5
Police Department	0	1	2	3	4	5

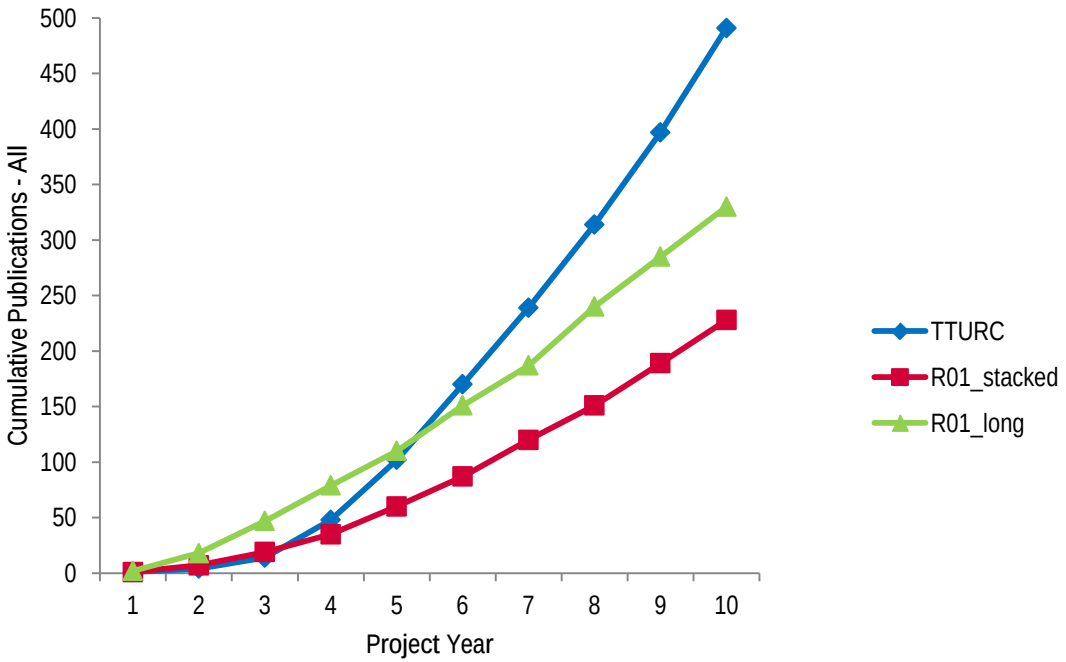
Visualize Collaborative Relationships



Frey, B.B., Lohmeier, J.H., Lee, S.W., and Tollefson, N. (2006). Measuring collaboration among grant partners. American Journal of Evaluation *27, 383-392.*

Funding for Team Science

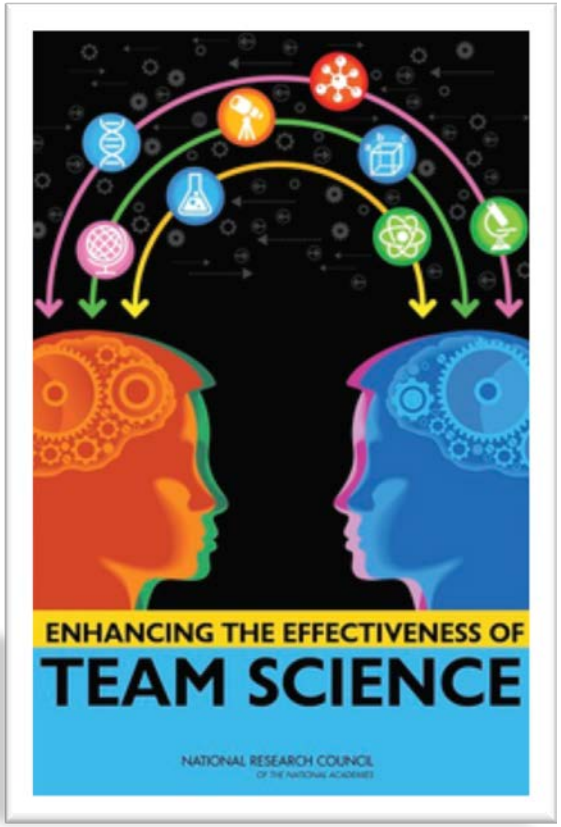
Comparing (cumulative) number of publications of TD initiative with matched R01 projects from the tobacco field over 10-year period



Centers initial lag in number of publications is eliminated around Project Year 4.

Hall, K.L., Stokols, D., Stipelman, B.A., Vogel, A.L., Feng, A., Masimore, B., Morgan, G., Moser, R.P., Marcus, S.E., and Berrigan, D. (2012). Assessing the Value of Team Science: A Study Comparing Center- and Investigator-Initiated Grants. American Journal of Preventive Medicine *42*, 157-163.

National Academies Consensus Report



BOARD ON BEHAVIORAL, COGNITIVE, AND SENSORY SCIENCES
DIVISION OF BEHAVIORAL AND SOCIAL SCIENCES AND EDUCATION

Thursday, December 11, 2014

enter search terms | Search

Subscribe | SHARE | Contact Us

BBCSS HOME | ABOUT BBCSS | NEWS AND EVENTS | OUR WORK | PUBLICATIONS | WORK WITH US

BBCSS - TOPICS

- Cognitive Sciences and Learning
- Health and Aging
- National Security and Intelligence
- Research and Evaluation

The Science of Team Science

Project Scope

The NRC will conduct a consensus study on the science of team science to recommend opportunities to enhance the effectiveness of collaborative research in science teams, research centers, and institutes. The science of team science is a new interdisciplinary field that empirically examines the processes by which large and small scientific teams, research centers, and institutes organize, communicate, and conduct research. It is concerned with understanding and managing circumstances that facilitate or hinder the effectiveness of collaborative research, including translational research. This includes understanding how teams connect and collaborate to achieve scientific breakthroughs that would not be attainable by either individual or simply additive efforts. The committee will consider factors such as team dynamics, team management, and institutional structures and policies that affect large and small science teams. Among the questions the committee will explore are:

- How do individual factors (e.g., openness to divergent ideas), influence team dynamics (e.g., cohesion), and how, in turn, do both individual factors and team dynamics influence the effectiveness and productivity of science teams?
- What factors at the team, center, or institute level (e.g., team size, team membership, geographic dispersion) influence the effectiveness of science teams?
- How do different management approaches and leadership styles influence the effectiveness of science teams? For example, different approaches to establishing work roles and routines and to the division of labor may influence team effectiveness.
- How do current tenure and promotion policies acknowledge and provide incentives to academic researchers who engage in team science?
- What factors influence the productivity and effectiveness of research organizations that conduct and support team and collaborative science, such as research centers and institutes? How do such organizational factors as human resource policies and practices and cyberinfrastructure affect team and collaborative science?
- What types of organizational structures, policies, practices and resources are needed to promote effective team science, in academic institutions, research centers, industry, and other settings?

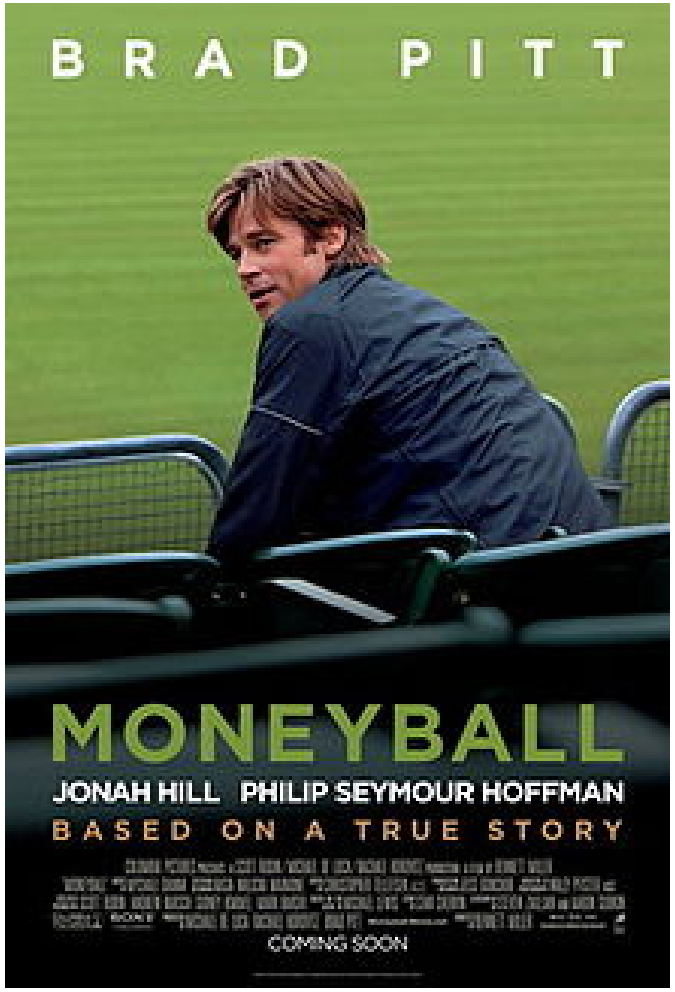
Sponsored by the National Science Foundation and Elsevier, the project began in October, 2012. A report will be issued in late 2014 or early 2015.

Members

Dr. Nancy J. Cooke, *Chair*, Arizona State University
Dr. Roger Blandford, Department of Physics, Stanford University

ELSEVIER

Team Composition



Team of Experts ≠ Expert Team

The Winning Model

- Right mix of expertise and team-players
- Intervention/coaching to help use the collective expertise well

Hackman, J.R. (2011). Collaborative Intelligence: Using Teams to Solve Hard Problems .

Collaboration Enhancement

- Complex societal research problems to require cross-disciplinary collaborative investigation and scholarly activity, with more work being done in teams
- Effective practices and tools to support the efforts of researchers and research development professionals to initiate and nurture partnerships and secure collaborative extramural research funding are needed
- Collaboration facilitation necessary to reduce time spent *searching*, to ***find*** matches more quickly, and to help make non-intuitive matches—accelerate knowledge discovery

28

Research Networking Systems

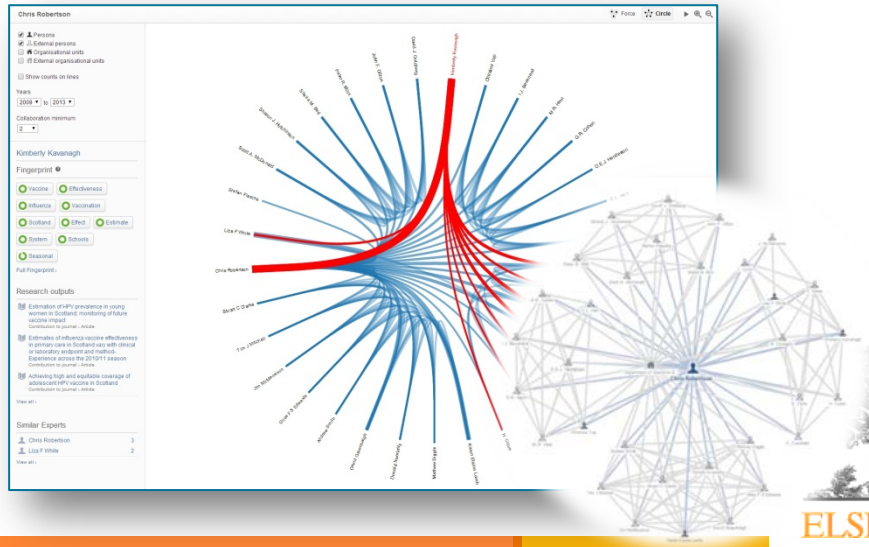
- Web-based knowledge management system for the research enterprise
- Faculty expertise/profile systems
  - Harvest expertise and scholarship information
  - Automatic ingest from authoritative systems, validated data
  - Interoperability and connectivity with: school-level resources, University enterprise systems, national research networks, publicly available research data, and restricted data about faculty expertise and scholarly/research activity
- Recommender system
- Analytics to evaluate research, scholarly activity, and resources
- Facilitate new collaborations through discovery of expertise
- Intellectual networking vs. social networking
- Research network visualization

ELSEVIER

Elsevier's Pure Experts Portal

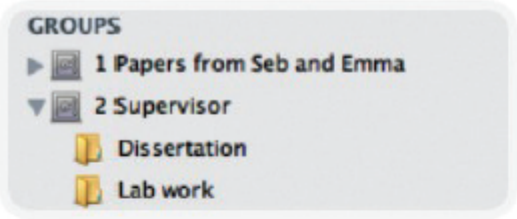
Facilitate collaborations by exposing publishing connections and make researchers' accomplishments readily discoverable

- Demonstrate researchers' activities to the research community, government agencies, industry, media and the public
- Facilitate cross-institutional collaborations, economic development initiatives and other external partnerships through public portals
- Identify potential collaborators by accessing researchers with similar expertise via semantic profile mapping and via coauthor and institutional visualizations



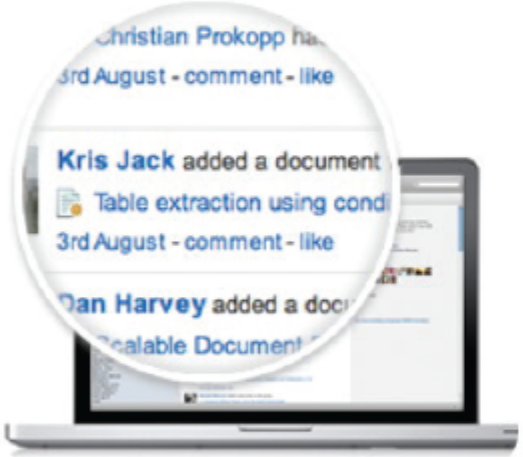
ELSEVIER

Mendeley



Share papers and collaborate

Whether you're a research team, lab, or university class - sharing papers can be a challenge. Simply create public or private groups and start sharing documents instantly.



Communication made easy

Group members can see papers and folders you add to the group on their newsfeed. Keep up-to-date with your collaborators and make working together a walk in the park.

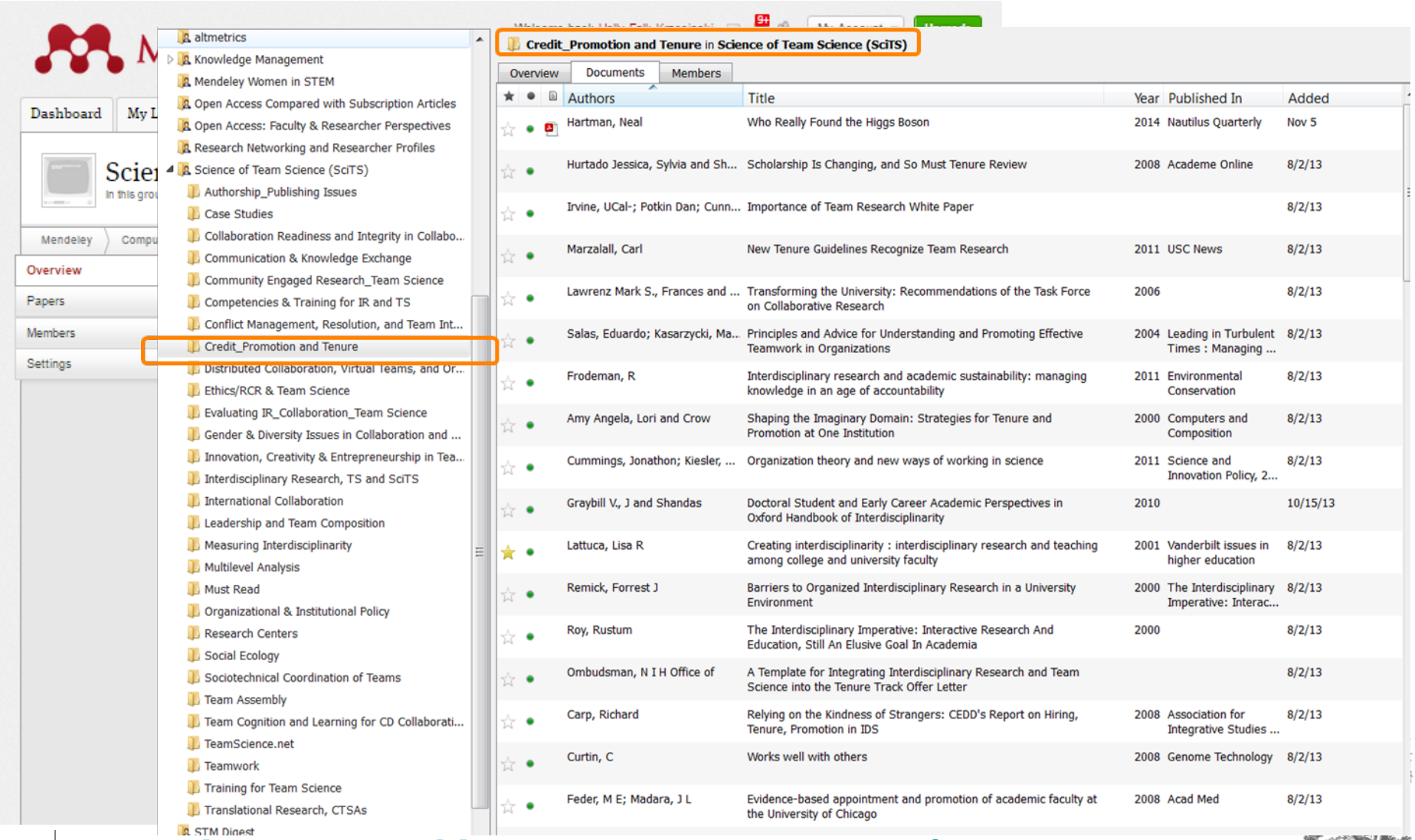
- See when others add documents
- Comment and like to start discussion
- Watch projects progress over time

All your ideas in real-time

Reviewing an article with your colleagues? When a group member adds a note, highlight or summary to a group document, the edit is visible to all the members of the group.

ELSEVIER

Science of Team Science (SciTS) Library



http://www.mendeley.com/groups/3556001/science-of-team-science-scits/

ELSEVIER

TEAM SCIENCE GRANTSMANSHIP

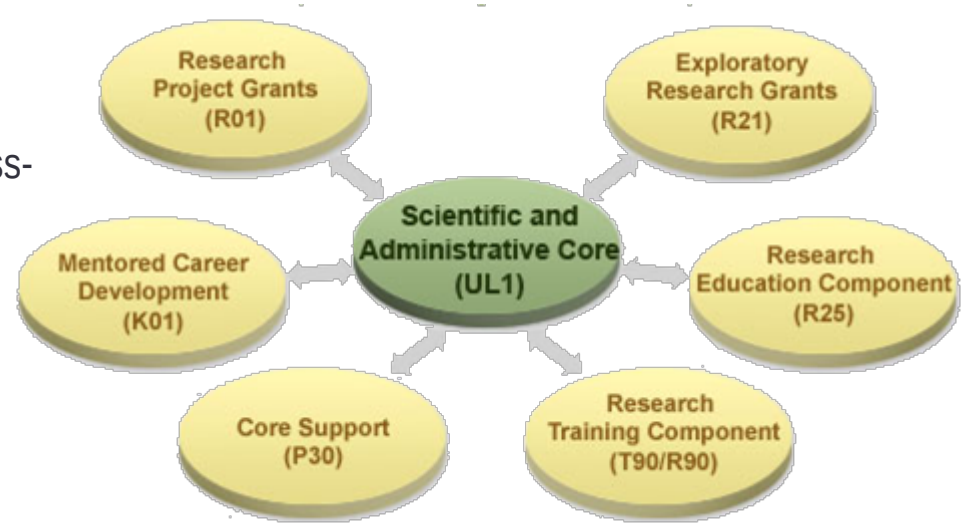
"Most of the work still to be done in science and the useful arts is precisely that which needs knowledge and cooperation of many scientists and disciplines. That is why it is necessary for scientists and technologists in different disciplines to meet and work together, even those in branches of knowledge which seem to have least relation and connection with one another."

- *French chemist Antoine Lavoisier, 1793 (see Macrina, F.L. 2005. Scientific Integrity : Text and Cases in Responsible Conduct of Research, 3rd ed, Washington, D.C., ASM Press)*

ELSEVIER

Team Science Proposal Development

- Complex Initiatives
  - Central organizing scientific theme or problem that can be addressed by science
  - Several collaborating investigators
  - Multiple projects closely related conducted through a coordinated, collaborative, and cross-disciplinary approach
  - Dispersed
- Multiple Components
  - Administration
  - Research
  - Pilot Projects
  - Capital Equipment
  - Cores
  - Education/Training
  - Clinical /Industrial Translation
  - Community Health
  - Outreach



NIH Common Fund Interdisciplinary Research Consortia
http://commonfund.nih.gov/interdisciplinary/

- Capacity Building Opportunities!

ELSEVIER

Team Grant Proposals

- Integrated effort
- Coordination, interrelationships, cohesiveness, and synergy among the research projects and cores as they relate to the common theme
- Advantages of conducting the proposed research as a team initiative vs. independent research projects
- Mechanisms for regular communication and coordination among investigators in the program
- Appropriateness of leadership/management/administrative structures, and day-to-day operations of the program

Team Science Funding

- NIH & NSF
  - Mechanisms
  - Specific Programs
  - Research Centers
  - Collaborative Admin Supplements
  - Joint Programs
  - Intern'l Collaboration
  - Capacity Building
  - DOE
  - NASA
  - DoD
  - ED
  - NEH
  - DOT
  - Foundations

NORDP
National Organization of Research Development Professionals

http://www.nordp.org/funding-opportunities

ELSEVIER

NSF INSPIRE

- Integrated NSF Support Promoting Interdisciplinary Research and Education (INSPIRE) initiative
  - Support bold interdisciplinary projects in all NSF-supported areas of science, engineering, and education research
  - Proposals must be interdisciplinary (>1 divisions/programs) and potentially transformative
- Previously pilot Creative Research Awards for Transformative Interdisciplinary Ventures (CREATIV), now Track 1
- Track 2: Mid-scale sized
- Track 3: Single investigator

ELSEVIER

Building Research Teams

- Federal
  - NIH Exploratory Center Grants (P20)
    - Support planning activities associated with large multi-project program project grants
    - Support for shared resources and several small exploratory research projects (R03-like)
    - Focused on a common research theme
  - Canadian CIHR, NSERC, and SSHRC Planning Grants programs are similar
  - NIH "Repurposed" R13
    - Scientific Meetings for Creating Interdisciplinary Research Teams (R13)
  - NSF Research Coordination Networks (RCN)
    - Research Networks in the Mathematical Sciences (RNMS)
  - NSF Industry/University Cooperative Research Centers Program (I/UCRC) Planning Grant
- Institutional
  - Northwestern FSM Dean's Multi-investigator Seed Grant Program
  - CBC Exploratory Workshops Funding
  - UCSF Team Science Grant
  - U of MI Mcubed
  - Harvard Provost's Fund for Interfaculty Collaboration
  - University of Texas at El Paso IDR Seed Grant program
  - Mizzou Advantage Program

ELSEVIER

Opportunities for Early Career Faculty

- Negotiate that an R01-like project on a P01 (PPG) counts as an actual R01 award
- Access to research cores
- Access to capital equipment
- Access to graduate student (and postdoctoral support)
- Access to admin resources
- Likelihood of earlier publication on higher impact manuscripts
- Women scientists who don’t collaborate are less productive

ELSEVIER

Multiple PI/PDs

- Team approach
- Complex problem
- Project authority and responsibility
- Distribution of credit
- Allocation of funds
- Decision must be consistent with the scientific/program goals of the project
- Must develop a Leadership Plan

ELSEVIER

Grant Proposal Fodder

Team Development Activities

- Beyond the NIH Leadership or NSF Management Plan
- Identify and engage potential collaborators and assemble the team
- Develop partnerships, a collaborative research agenda, shared conceptual framework
- Consider how to expand the *number* and *type* of investigators working in the collaboration
- Promote mentoring, conflict management, cross-talk, integration
- Disseminate findings, sustain the collaboration
- Evaluate process and outcomes

ELSEVIER

ENHANCING COLLABORATION

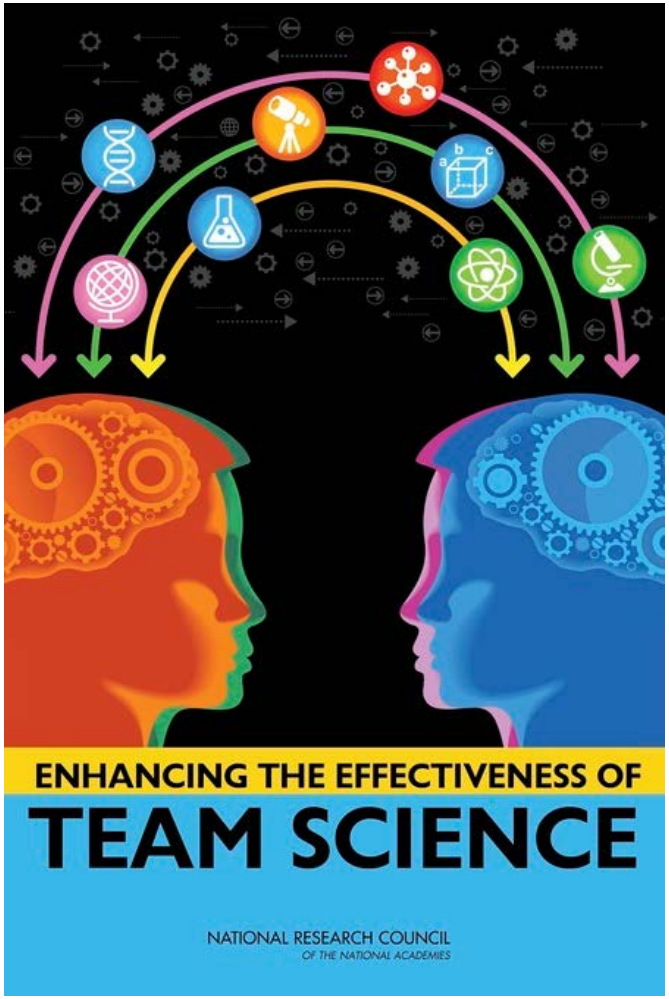
"If more work is being done in teams and that work is of greater impact, then surely locating the right members for any team is more important than ever."

- *Carey, J. (2011). Faculty of 1000 and VIVO: Invisible Colleges and Team Science. In Issues in Science and Technology Librarianship.*

ELSEVIER

Supporter of Team Science

- NRC Science of Team Science consensus study and report
- UK and Canadian Team Science initiatives
- Annual Science of Team Science (SciTS) Conference
- University of California system annual Team Science Retreat (Elsevier Foundation)



ELSEVIER

Fostering Collaboration

https://www.elsevier.com/research-intelligence/resource-library/ERI-Collaboration_Brochure

Elsevier Research Intelligence Portfolio

The rich functionality of the **Elsevier Research Intelligence** (ERI) portfolio helps institutions quickly identify expert collaborators from across disciplines and institutions, facilitating more effective and productive partnerships.

Powered by data from **Scopus®** and the semantic **Elsevier Fingerprint Engine™**, the ERI portfolio allows institutions to:

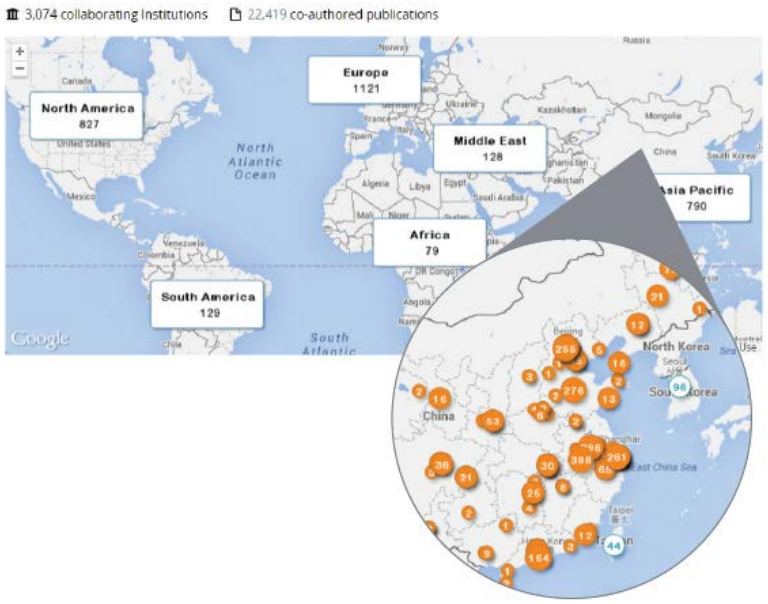
- **Identify** current and **discover** potential **collaborators**
- Provide data-driven analysis of **collaborative behavior** and impact
- Deliver insight into how institutions can facilitate **more powerful collaborations**

SciVal

Develop Collaborative Partnerships on a Global Scale

- Identify and analyze existing and potential collaboration opportunities based on publication output and citation impact;
- Explore rich visualizations of your institution's current and prospective research partnerships across sectors;

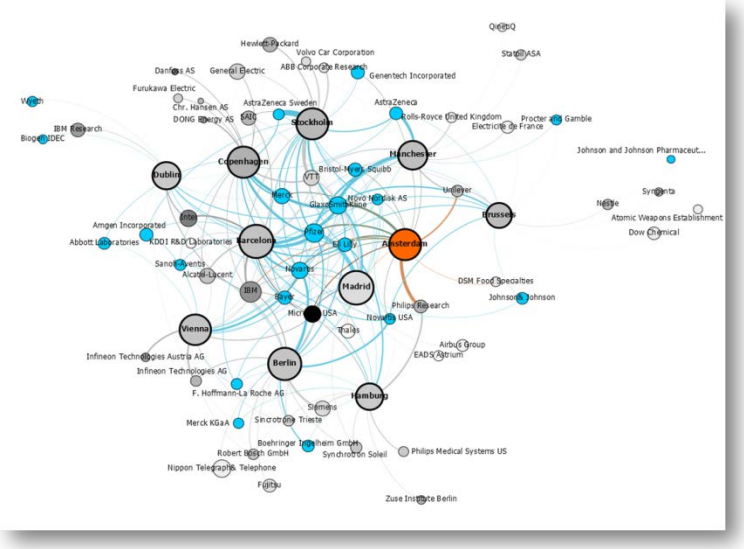
- Identify **top collaborative institutions**, geographic regions, countries and co-authorship;
- Gain insight into the key players in **emerging research fields** to find potential new collaborators



Analytical Services

Custom Analyses to Understand Institutional Research Performance Through Collaboration

- Intra- and inter-institutional collaboration;
- National and International collaboration;
- Cross-sector collaboration



International Collaboration
In what areas does our country or institution collaborate the most internationally?

Improving and building partnerships
Who are our most prolific collaboration partners according to the effect of the collaboration on both partners' citation impact?

ELSEVIER

CONNECT WITH ME

Holly J. Falk-Krzesinski, PhD

Vice President, Global Academic & Research Relations
Elsevier ♦ Chicago, IL, USA

h.falk-krzesinski@elsevier.com

http://www.linkedin.com/in/hollyfk

@hfalk1

+1 847-848-2953

ELSEVIER

Copyright Information

ELSEVIER