

# Team Science Primer

Paul Estabrooks, PhD



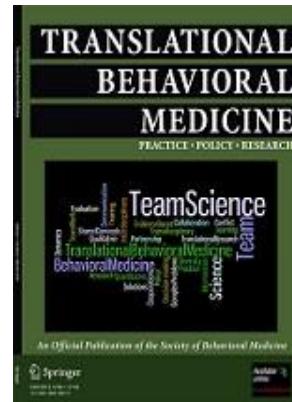
University of Nebraska  
Medical Center

**Science of Team Science  
Journal Supplement  
2008**



**Team Approaches to Science,  
Practice, and Policy in Health**

**2012**



**Collaboration Science and  
Translational Medicine**

**2014**



**2008**

**2010**

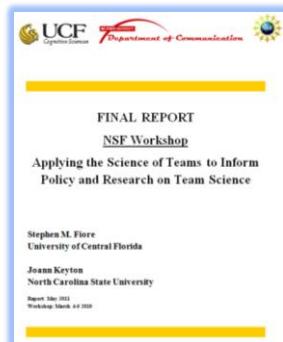
**2012**

**2013**

**2014**

**2015**

**Applying the Science of  
Teams to inform Policy and  
Research on Team Science  
NSF 2010**



NATIONAL RESEARCH COUNCIL  
OF THE NATIONAL ACADEMIES

**NATIONAL  
ACADEMIES  
CONSENSUS STUDY  
OF THE SCIENCE OF  
TEAM SCIENCE  
(2012-2014)**

**National Academies Press  
2015**

**ENHANCING THE EFFECTIVENESS OF  
TEAM SCIENCE**

Nancy J. Cooke and Margaret L. Hillen, Editors  
Committee on the Science of Team Science  
Division of Behavioral and Social Sciences and Education

NATIONAL RESEARCH COUNCIL  
OF THE NATIONAL ACADEMIES

THE NATIONAL ACADEMIES PRESS  
Washington, D.C.  
[www.nap.edu](http://www.nap.edu)

Adapted from Hall 2014

# WHAT IS “TEAM SCIENCE”?

- Team science – research conducted by more than one individual in an interdependent fashion, including research conducted by ***small teams and larger scientific groups.***
- Science teams: 2 to 10 individuals (most team science is conducted by groups of this size)—and likely reflective of scholars and most pilot study recipients.



# WHAT IS “TEAM SCIENCE”?

- Larger scientific groups: More than 10 individuals who conduct team science as larger groups and are typically composed of many smaller science teams can include 100s of scientists.
- CENTRIC should likely be considered a larger scientific group.
- Large scientific groups typically possess a differentiated division of labor and an integrated structure to coordinate and support the smaller science teams.

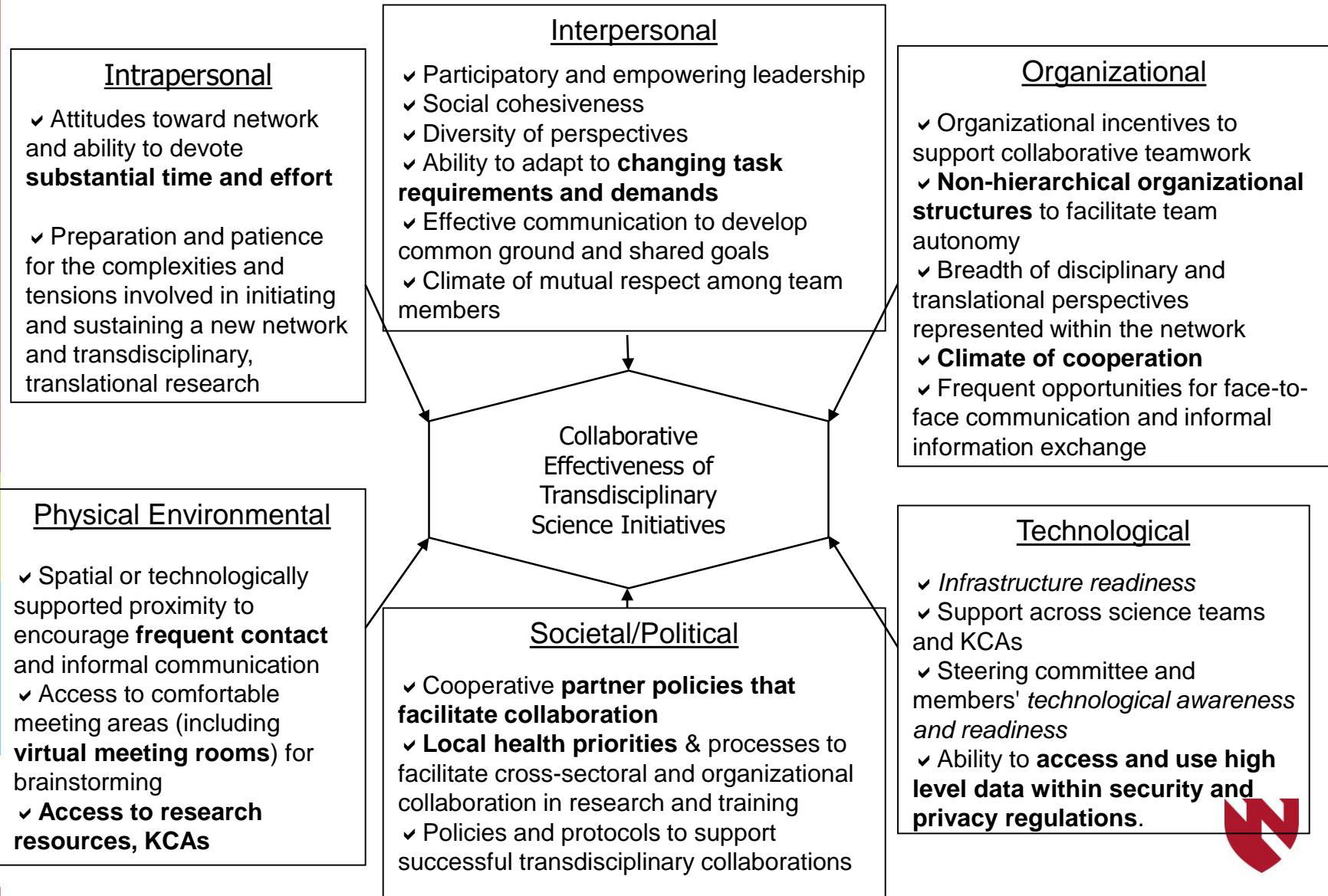


# WHAT IS “EFFECTIVE TEAM SCIENCE”?

- A scientific team or large scientific group’s capacity to achieve its goals and objectives.
  - Improved member outcomes (e.g., team member satisfaction and cohesion—ICE measure areas)
  - Improved team outcomes (publications, new funding... scientific breakthroughs!)



# Considering broader context in effective team science



Adapted from Stokols et al. 2008

# TEAM SCIENCE AND THE FOCUS ON DISCIPLINARY INTEGRATION

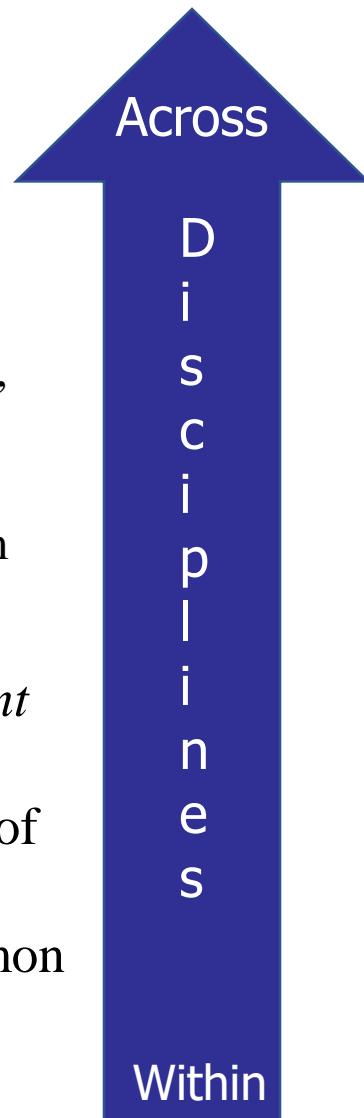
## Transdisciplinary (TD)

Researchers from *different disciplines* work jointly to develop and use a shared conceptual framework that synthesizes and extends discipline-specific theories, concepts, and methods, to create *new approaches* to address a common problem

## Multidisciplinary (MD)

Researchers from *different disciplines* work *sequentially*, with a goal of eventually combining results to address a common problem

Adapted from Hall 2014



## Interdisciplinary (ID)

Researchers from *different disciplines* work jointly to address a common problem. Some integration of perspectives occurs, but contributions remain anchored in their own disciplines.

## Unidisciplinary (UD)

Researchers from a *single discipline* work together to address a common problem



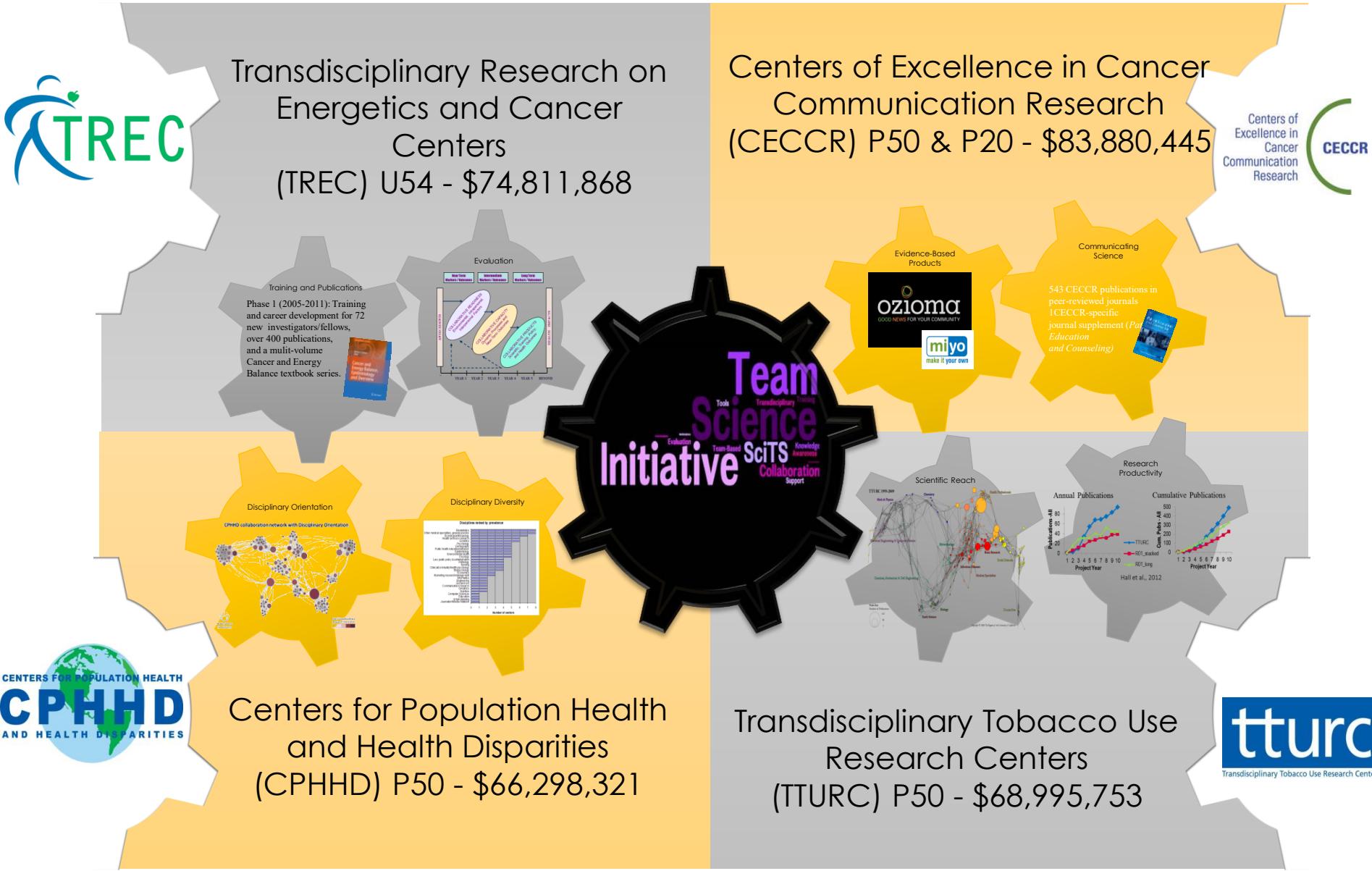
# Some early descriptive research

- Multidisciplinary projects superior to unidisciplinary projects in producing innovation and scientific tools
- Important findings for the CENTRIC:
  - The projects with **more coordination opportunities and infrastructure** had **more successful outcomes**
    - Direct supervision and reporting of objective achievement
    - Opportunities for face-to-face meetings on a regular basis
  - Projects with less coordination resulted in fewer training experiences and outreach activities.
  - Greater number of universities involved in a collaboration predicted fewer coordination activities and fewer project outcomes



# *Team Science Data from NCI*

## *(Shout out to Dr. Kara Hall for the following Slides)*



# TRANSDISCIPLINARY COMPONENTS TO ADDRESS CONSTRAINTS

**Similar to CENTRIC? Replace Transdisciplinary Focus with chronic disease focus**

Goal: Foster transdisciplinary collaborations to produce science that contributes to reducing the cancer burden

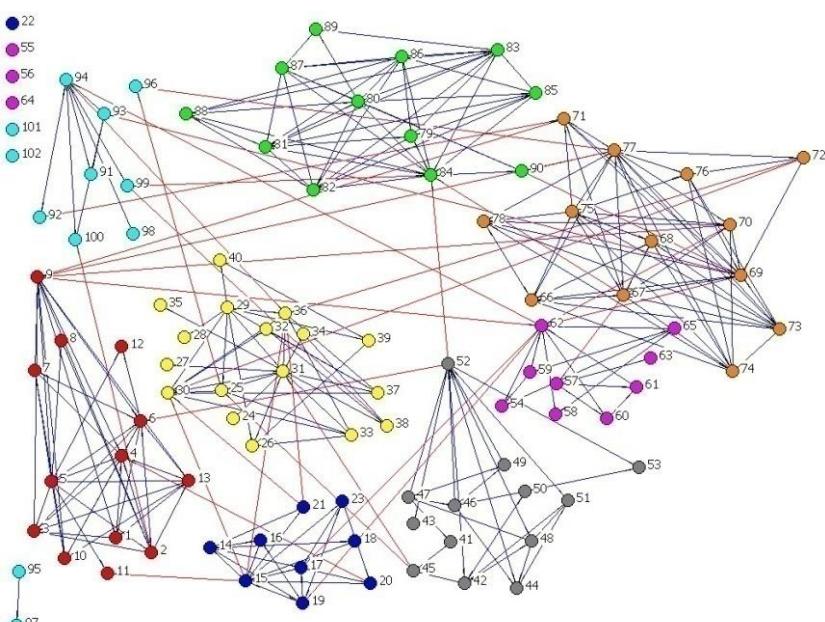
Strategies include:

- Funding that emphasized transdisciplinary research
- Multiple linked projects/centers with facilitated integration
- Cores/Coordination Center to provide administrative support, maximize diverse collaboration, and bridging mechanisms
- A steering Committee to provide consistent messaging and reinforce transdisciplinary goals
- Developmental pilot project funds
- Semi-annual meetings to foster new collaborations
- Training to address needed transdisciplinary competencies for investigators at multiple career stages
- Evaluation

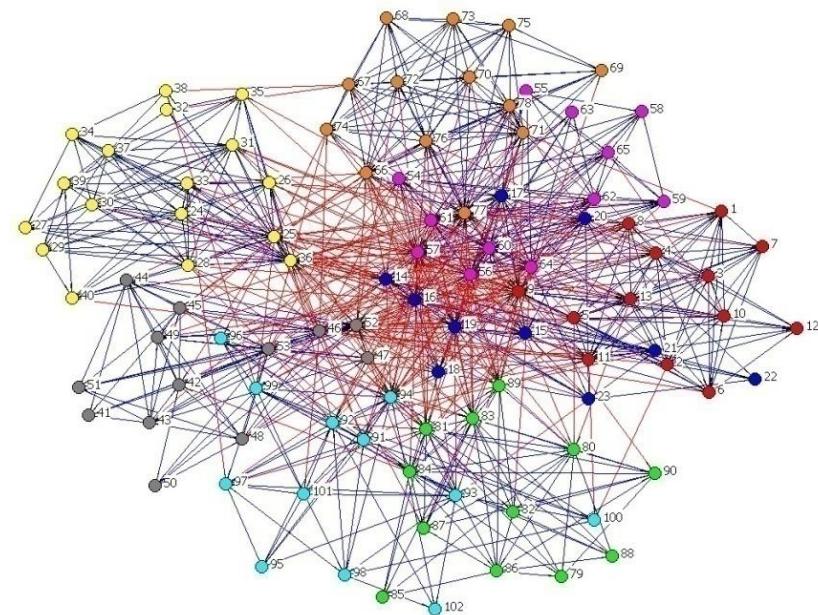


# Cross-Center Network Ties Before and After CPHHD Funding

Prior to Funding



Subsequent to Funding



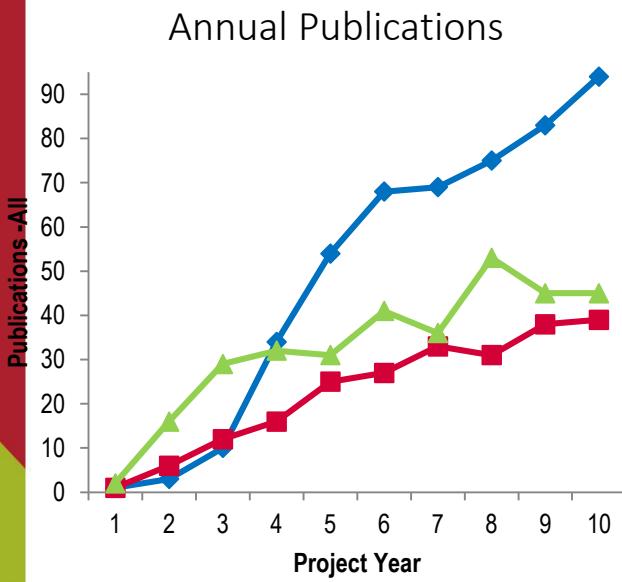
- Increase in collaboration between investigators across centers
- Endorsement of ID/TD = brokers



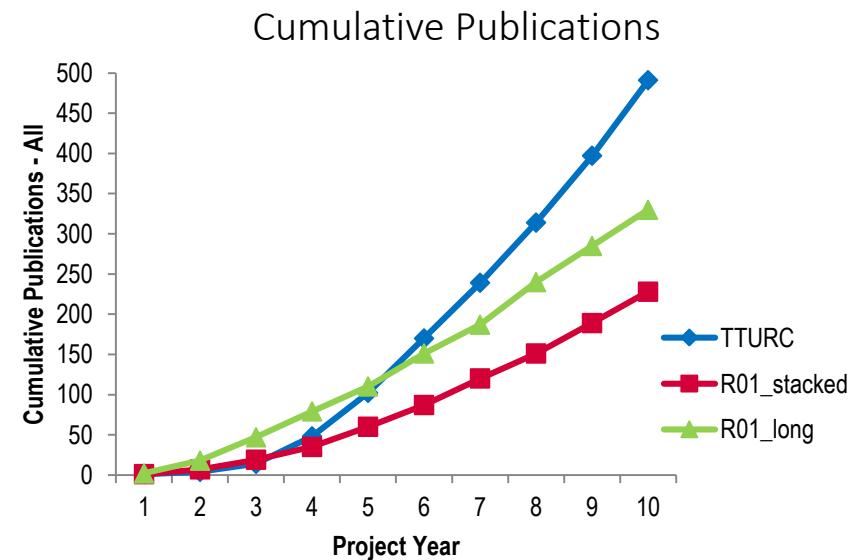
## Key

Red=OSU	Gray=Tufts	Green=UTMB
Blue=UPenn	Pink=UC	Yellow = Rand
Turquoise=Wayne State		Orange=UIC

Dots in upper left corner of the "prior" network represent researchers with no ties to others in the network



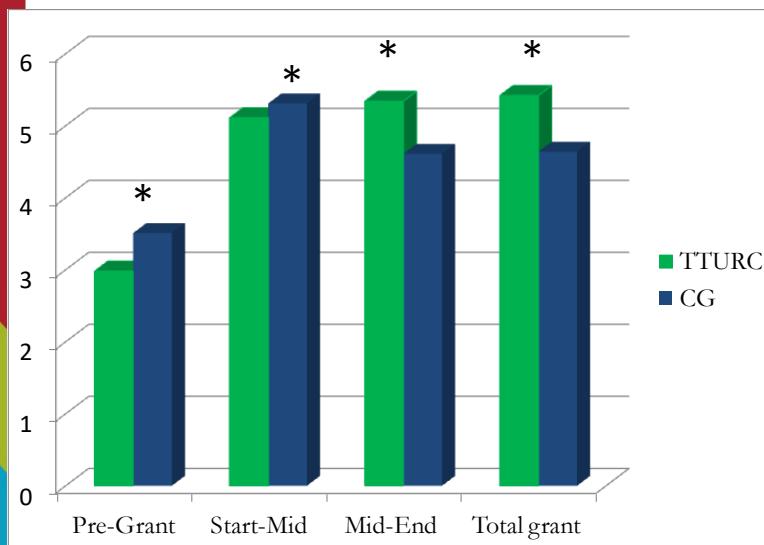
TD center publications have longer start up period compared to R01s but become more productive over time



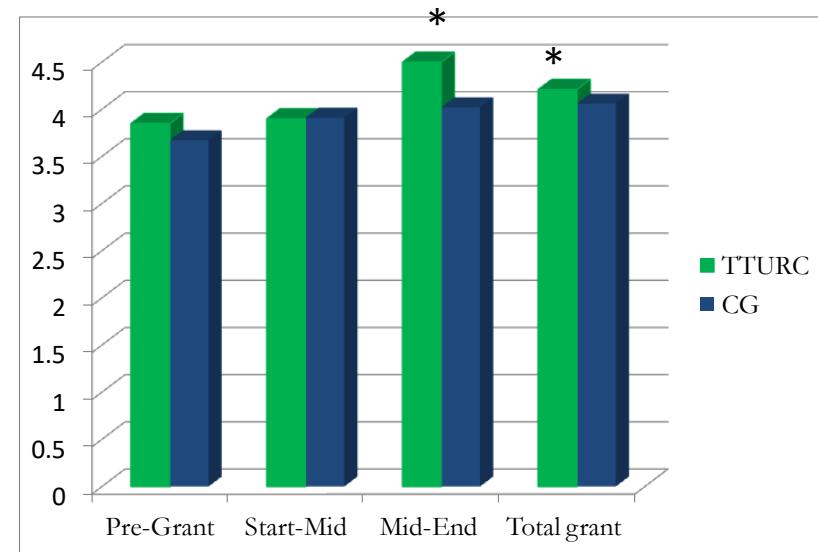
Centers initial lag in number of publications is eliminated around Project Year 4.

## TTURC vs. R01 on Measures of Productivity/Impact

Average # of publications per year



Average journal impact factor



**Key Finding:** TTURC investigators start with fewer publications, and outpaced CG by mid-end ; similar trend for impact factor

**Method:** Comparison of TTURC and R01 investigators' citations rates from *entire corpus of publications* 1996-2010.



# 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](#)

## Interdisciplinary Research and Team Science

In this blog entry, Julie Thompson Klein, PhD, Professor of Humanities and Faculty Fellow for Interdisciplinary Development at Wayne State University, discusses the relationship between team science and disciplinary integration. She describes the history of interdisciplinarity into the U.S. and identifies key online and print resources about collaboration and disciplinary integration.

[> Learn More](#)

### > Discover what resources are available.

[Search](#)[Advanced Search](#)**OR**[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.

[Login](#) | [Register](#)

### Resources

[Tools](#)[Measures](#)[Bibliography](#)[Editors' Picks](#)

### Connections

[Recent Blog Posts](#)[Listserv](#)[Communication Materials](#)

[www.teamsciencetoolkit.cancer.gov](http://www.teamsciencetoolkit.cancer.gov)

The Team Science Toolkit is an interactive website that provides resources to help users support, engage in, and study team-based research.

# Developing skills for team science

Team Science Online Learning Modules

The screenshot shows the homepage of the COALESCE Team Science Online Learning Modules. At the top left is the COALESCE logo, which features three stylized human figures in black and grey. To the right of the logo is the word "TEAMSCIENCE" in large, bold, grey letters. Below the title are four navigation tabs: "ABOUT", "MODULE DESCRIPTIONS", "MESSAGE BOARDS", and "RESOURCES". Underneath these tabs are five square icons with corresponding text labels below them:

- Introduction START HERE** (Icon: people in a hallway)
- The Science of Team Science** (Icon: a group of diverse people holding hands)
- Team Science Research Process in Behavioral Science** (Icon: profile of a head with gears)
- Team Science Research Process in Basic Biomedical Science** (Icon: microscope)
- Team Science Research Process in Clinical Medical Science** (Icon: blue star of life with a caduceus)

Below the icons is a message: "Please disable your pop-up blockers before launching the modules". There is also a link: "To view the Team Science Commercial video, [click here!](#)". At the bottom of the page are social media links for Facebook and Twitter.

**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-6-3612 from the Office of  
Behavioral & Social Sciences  
Research, (PI: Bonnie Spring)



NORTHWESTERN  
UNIVERSITY

