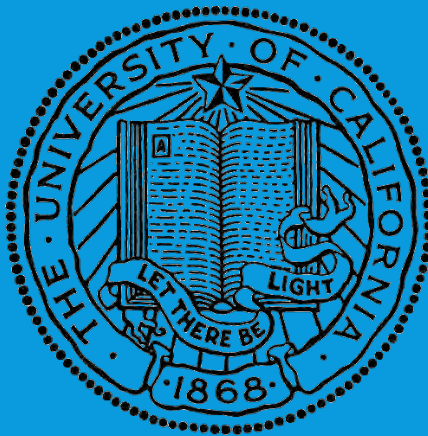


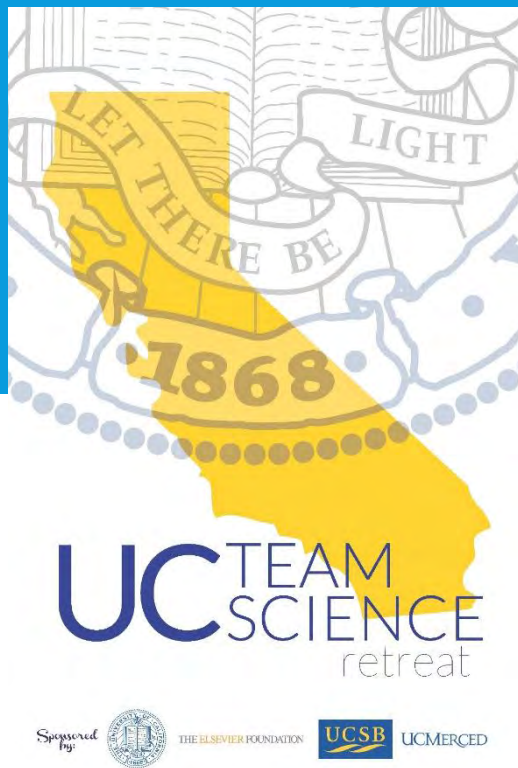
CALIFORNIA CREDITS:

The Role of Research Development in Promoting and Furthering
Research, Excellence and Diversity in Team Science



CSU The California State University

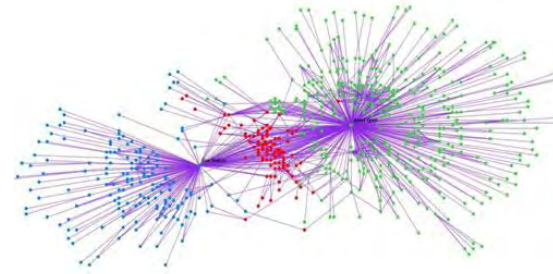
Susan Carter (UC Merced), John Crockett (SDSU), Barbara Walker (UCSB)



Co-PIs:

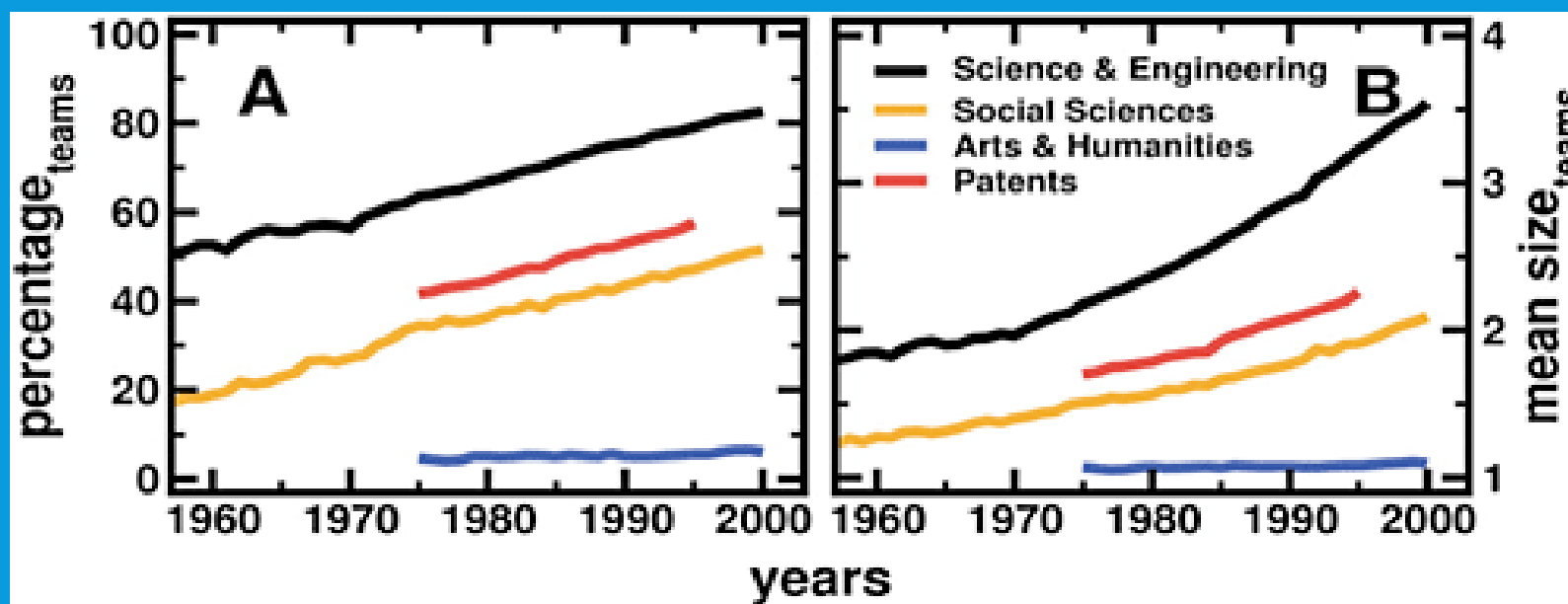
- Barbara Endemaño Walker, UCSB
- Susan Carlson, UCOP
- Rebecca Lewison, SDSU
- John Crockett, SDSU
- Valerie Leppert, UC Merced
- Susan Carter, UC Merced
- Amanda Quintero, CSU Channel Islands

TEAM SCIENCE



- **Definition:** interdisciplinary, collaborative scientific research among two or more researchers in which team members integrate their perspectives and methods in a single research endeavor.
- Increasingly the **norm**.
 - (Wuchty et al. 2007; Englander 2014)
- Objective often to solve most **complex and intractable** scientific and social problems.
- Accelerates scientific and technological **innovation**, and provides a mechanism for **translating** scientific research into practices and policy.
 - (Uzzi et al. 2013).

WUCHTY S, JONES BF, UZZI B. (2007). THE INCREASING DOMINANCE OF TEAMS IN PRODUCTION OF KNOWLEDGE. *SCIENCE*.



TEAM SCIENCE IMPACTS ON CAREER AND INSTITUTION



- TS projects garner more funding.
- TS projects yield greater publication productivity.
- TS projects yield higher impact publications.
- Strong network of collaborators and co-authors is critical to a more productive and successful academic career.
 - (Hitchcock et al.1995; Bozeman & Corley 2004; Bland et al. 2005; Haslam & Laham 2009; Haller & Welch 2013; Seibert et al. 2014).

(Uzzi et al. 2013 ,
Stokols et al. 2008;
Falk-Krzesinski et al.
2011;
Elfner et al. 2011;
Hall et al. 2012;
Salazar et al. 2012).

TEAM SCIENCE AND DIVERSITY



- Diversity on teams has positive effects on creativity, innovation, and productivity.
 - (Hong & Page 2004; Woolley et al. 2010; Bear & Woolley 2011).
- Scientific research enhanced when informed by diverse (and thus often broader) viewpoints and research questions.
 - (Margolis & Fisher 2003)
- Women and URM scientists have made scientific discoveries because of their particular gendered and racialized perspectives experiences.
 - (Melo-Martín & Intemann 2010)

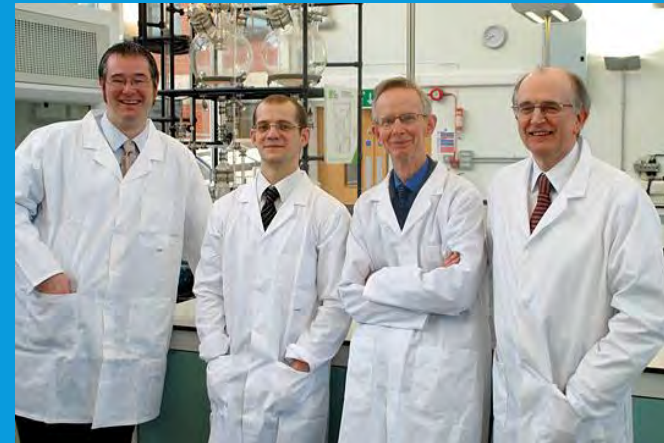
CAMPBELL, L. G., MEHTANI, S., DOZIER, M. E., & RINEHART, J. (2013). **GENDER-HETEROGENEOUS WORKING GROUPS PRODUCE HIGHER QUALITY SCIENCE.** *PLOS ONE*, 8(10), E79147.

- Among ecology and environmental scientists, **authorship teams with at least one woman received 34% more citations** than publications produced by homogeneous teams, and that peers perceive the publications produced by gender-diverse groups to be of higher quality.



FREEMAN, R. B., & HUANG, W. (2014). *COLLABORATING WITH PEOPLE LIKE ME: ETHNIC CO-AUTHORSHIP WITHIN THE US* (NO. W19905). NATIONAL BUREAU OF ECONOMIC RESEARCH.

By examining the ethnic identity of authors in over 2.5 million scientific papers written by US-based authors from 1985 to 2008, we find that persons of similar ethnicity coauthor together more frequently than predicted by their proportion among authors. The **greater homophily is associated with publication in lower-impact journals and with fewer citations**. Meanwhile, papers with authors in more locations and with longer reference lists get published in higher-impact journals and receive more citations.



HOWEVER...

- Women and URM scientists are **less likely** to participate in team science collaborations, and their participation in these networks **develops later** in their careers.

- (Kyvik & Teigen 1996; Fox & Mohapatra 2007; Misra et al. 2012; Kegen 2013).

WHY?

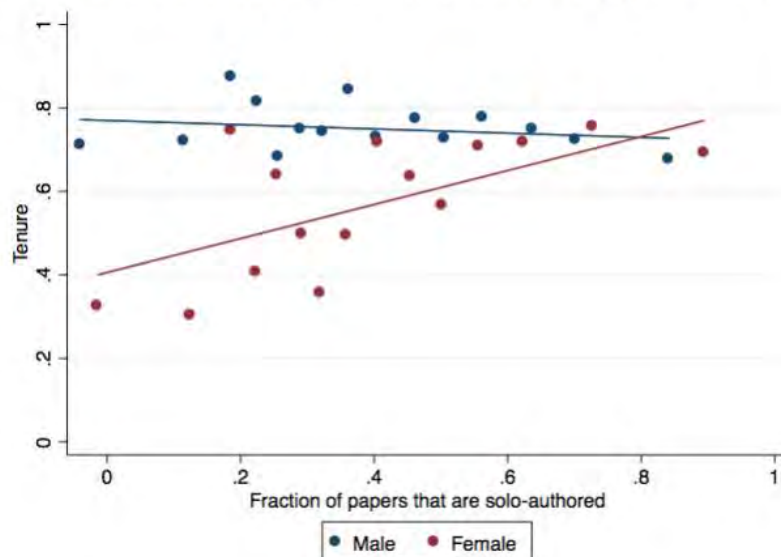
- Critical time of family formation (leaks in the pipeline between Ph.D. receipt and tenure for women faculty;
- Negative perceptions of women scientists may prevent them from being chosen as collaborators;
- Women opt out of interdisciplinary collaboration because they are aware that their male counterparts will receive more credit for shared ideas and publications;
- Isolation;
- Overburden of service;
- Micro-aggressions, Conscious/unconscious/implicit bias, stereotype threat;
- Barriers for URM scientists in winning research grants from federal agencies;
 - (Ginther et al. 2011 (NIH))
- URM faculty are at a similar if not compounded disadvantage vis “intersectional” identities and experiences.

CAUTION!

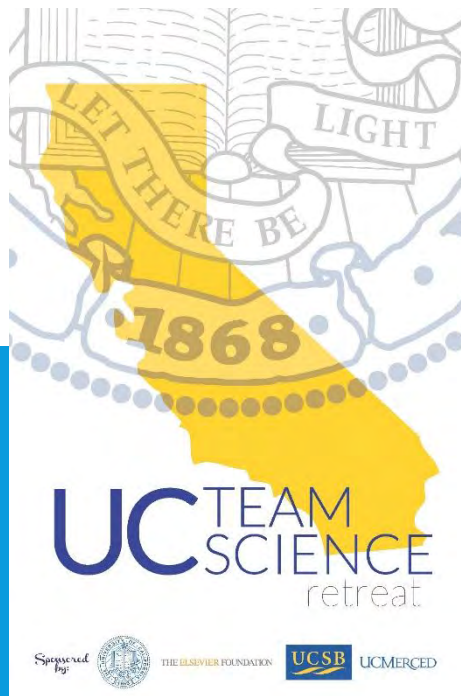
TEAMWORK DOESN'T ALWAYS WORK FOR WOMEN

- Value of collaboration and co-authorship is discipline-, career-level, and gender-specific
- Among economists, for example, women who co-author may have lower rates of tenure.

Figure 1: Relationship between composition of papers and tenure

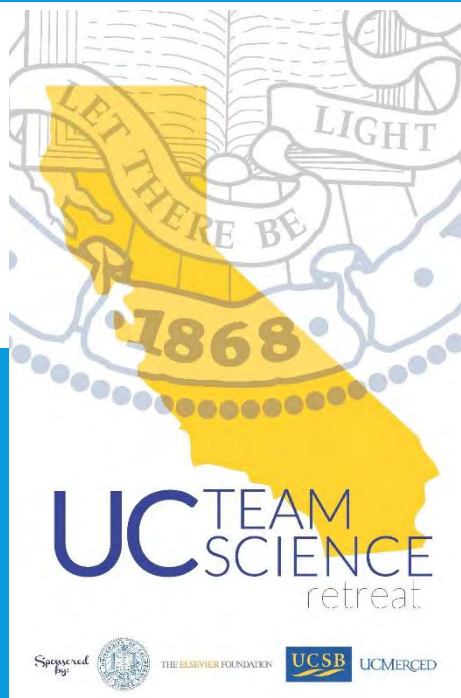


Sarsons, H. (2015). *Gender Differences in Recognition for Group Work*. Harvard University working paper (August 9, 2015).

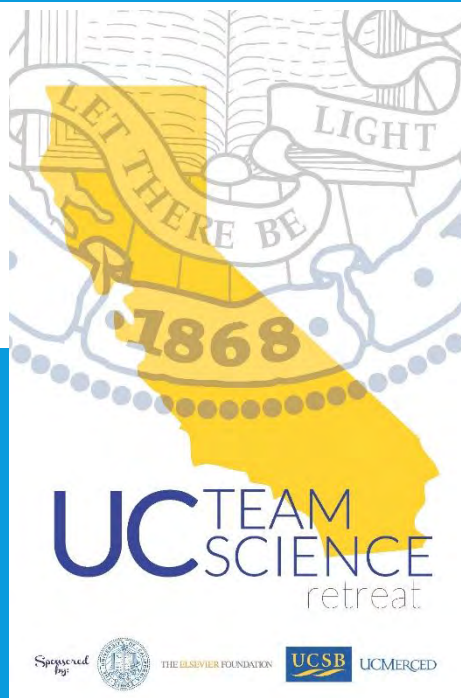


ELSEVIER

- **GOAL:** CREDITS is an integrated research and training program to increase and enhance Team Science capacity, effectiveness, and excellence in California.
- Targeted to women faculty from all ladder ranks and researchers with a focus on underrepresented minorities (URMs).



- *Key Activities of each Retreat include:*
 - Training to develop the capacity for team science as well as the leadership and management skills necessary to be an effective team leader and member.
 - Training on collaborative proposal development and grant writing. Research development/team science and scientific writing experts, and representatives of major federal funding agencies, provide 1:1 consultations.
 - Training to understand how TS intersects with institutional and funding agency culture.



- Summer 2014
 - Fall 2015
 - 34 women, 8 men; 23 % URM
 - Team Science training
 - Work-Life Balance Coaching
 - Community Building - Networking
- 2015-2020
 - 1st Retreat: Fall 2016
 - Theme-based team building
 - Training for campus leaders

SELECTION OF APPLICANTS

- All applications reviewed by a panel consisting of the PI Team, senior faculty and Vice Chancellors/Presidents for Research.
- Preference is given based on merit and contributions to diversity, while balancing distribution across campuses, career stage, and discipline.
- Leadership participants: Targeted recruitment of key individuals from participating institutions.

PROGRAM



- Team Science: Evidence-based Guidance for Practice and Policy
 - Communication, Trust and Conflict in Team Science
 - Diversity and Collaboration in Science Teams
 - Funding Agency Perspectives on Team Science Proposals
 - Team Science Experiences
 - Promoting Collaboration and Discovery through Extraordinary Leadership
 - Navigating Life in the UC System
 - Work-life Satisfaction in Academic and Science Careers
 - Individual consultation with writing, research, funding agency, and leadership training faculty
 - Shared Meals and Outdoor Activities
- Team science training
- Team leadership & membership training
- Work-life balance
- Community Building/Networking

CONFIDENCE IN TS ABILITIES, PRE-POST: RETREAT PARTICIPANTS WHO AGREE OR STRONGLY AGREE THAT THEY HAVE THE ABILITY TO:

	Pre-TS Retreat		Post-TS Retreat		Increase
	Number (n=43)	%	Number (n=38)	%	
lead a team science project	25	58%	32	84%	26%
find collaborators in other disciplines	27	63%	32	84%	21%
work with diverse people	34	79%	37	97%	18%
network to find collaborators	24	56%	35	92%	36%
manage virtual collaboration	14	33%	24	63%	30%
navigate interpersonal challenges	14	33%	24	63%	30%

PERCEPTIONS OF SUPPORT, PRE-POST: RETREAT PARTICIPANTS WHO AGREE OR STRONGLY AGREE THAT :

	Pre-TS Retreat		Post-TS Retreat		Increase
	Number (n=43)	%	Number (n=38)	%	
My department provides support and/or resources for team science projects.	9	21%	15	39%	19%
My university provides support and/or resources for team science projects.	19	44%	24	63%	19%
My department encourages participation in team science projects.	17	40%	18	47%	8%
My university encourages participation in team science projects.	23	53%	23	61%	7%

TESTIMONIALS



- I gained much more than I expected.
- I gained some tools for improving the resubmission of my NIH Career Development Award.
- This helps me understand my team needs from my labs to my colleagues.
- I gained new insights into leadership, support for being a woman in science, and empowerment to come back to my home institution and lead!
- I've been implementing what I've learned ever since and the productive results are already clear and will certainly increase in future.
- I also learned how to surf which was fun!



VALUE OF CHILD CARE AND WORK-LIFE SATISFACTION

- 17/43 (40%) of participants brought children (and some spouses) in 2014
- 11/17 (65%) could not have attended without the child care
- *“The family-friendly organization of the retreat was a major reason that I was able to attend. Career development opportunities like this are important to me as a junior faculty member and researcher, but time with my family is also precious. Conferences like this that truly acknowledge that I am deeply dedicated to both my career and my family are incredibly important to my personal and professional satisfaction!”*

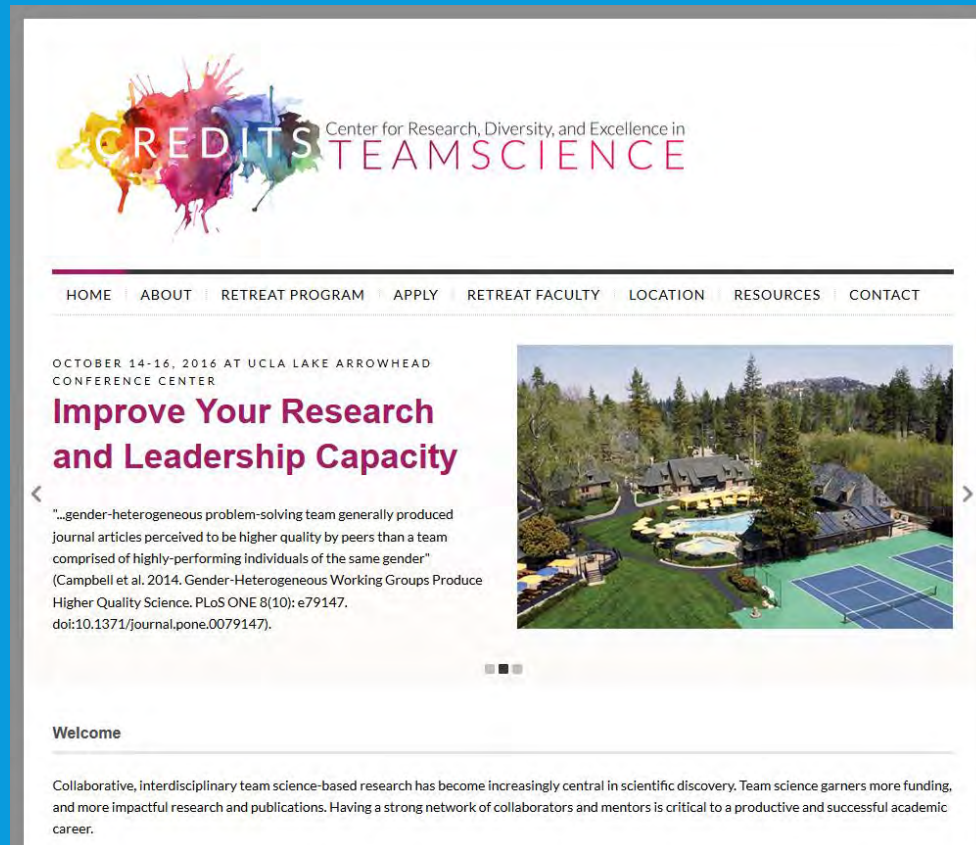
CREDITS TEAM SCIENCE RETREAT

- 3 day program
 - October 14-16, 2016
 - UCLA Conference Center at Lake Arrowhead
- **THEME: living with climate change**
- **Leadership Training**
 - Value diverse/multiple forms of scholarship
 - Value increasing #s of women and URM faculty
 - Value Team Science co-authorship
 - Implicit Bias in T&P and evaluating scholarship
- **Influence System-level T&P Policies Related to Team Science and Diversity**
 - Value diverse/multiple forms of scholarship
 - Value Team Science co-authorship compared to standard for sole, first, or last author



APPLY HERE (NEXT DEADLINE 6/10/16) :

- <https://oru.research.ucsb.edu/teamscience/apply/>



The screenshot shows the homepage of the CREDITS TEAMSCIENCE website. At the top, there is a logo for CREDITS TEAMSCIENCE, which includes a colorful splatter graphic. Below the logo, the text reads "Center for Research, Diversity, and Excellence in TEAMSCIENCE". A navigation bar contains links: HOME, ABOUT, RETREAT PROGRAM, APPLY, RETREAT FACULTY, LOCATION, RESOURCES, and CONTACT. The main content area features a headline "Improve Your Research and Leadership Capacity" and a sub-headline "OCTOBER 14-16, 2016 AT UCLA LAKE ARROWHEAD CONFERENCE CENTER". To the right of the text is a photograph of a large, modern building complex surrounded by trees and a swimming pool. Below the headline, there is a quote: "...gender-heterogeneous problem-solving team generally produced journal articles perceived to be higher quality by peers than a team comprised of highly-performing individuals of the same gender" (Campbell et al. 2014, Gender-Heterogeneous Working Groups Produce Higher Quality Science, PLoS ONE 8(10): e79147, doi:10.1371/journal.pone.0079147). At the bottom, there is a "Welcome" section with a paragraph of text.

CREDITS TEAMSCIENCE Center for Research, Diversity, and Excellence in

HOME | ABOUT | RETREAT PROGRAM | APPLY | RETREAT FACULTY | LOCATION | RESOURCES | CONTACT

OCTOBER 14-16, 2016 AT UCLA LAKE ARROWHEAD
CONFERENCE CENTER

**Improve Your Research
and Leadership Capacity**

"...gender-heterogeneous problem-solving team generally produced journal articles perceived to be higher quality by peers than a team comprised of highly-performing individuals of the same gender" (Campbell et al. 2014, Gender-Heterogeneous Working Groups Produce Higher Quality Science, PLoS ONE 8(10): e79147, doi:10.1371/journal.pone.0079147).

Welcome

Collaborative, interdisciplinary team science-based research has become increasingly central in scientific discovery. Team science garners more funding, and more impactful research and publications. Having a strong network of collaborators and mentors is critical to a productive and successful academic career.

EVALUATION OF CREDITS

- On-going external evaluation reports will guide PI Team and Advisory Committee in adapting program activities and approaches to meet CREDITS goals.
- Mixed methods approach evaluation will utilize electronic surveys, interviews/focus groups, bibliometric data analysis, and observation.
- Summative evaluation data will assess the overall results and impacts of the Retreats, including an analysis of longer term impacts, including rates of promotion/tenure, number of grants, number of collaborators on grants, number of publications, number of co-authors on publications, and impact of publications based on citation frequency.

EVALUATION, CONTD.

Administrative leaders will complete a pre-Retreat survey similar to participant surveys, but with additional questions to measure their perceptions of the climate for recognizing and rewarding diversity and TS at their institutions as well as their capacity and willingness to enact discussions and change around these issues at their campuses.

Summative evaluation data will be collected to assess the overall results and impacts of the Retreats on institutional change.

ROLE OF THE **RD** PROFESSIONAL IN SCIENCE TEAM COLLABORATIONS

- Metrics
- Help scientists build collaborations
- Build cross-disciplinary or cross-institutional bridges
- Create cross-disciplinary and cross field research concepts
- Build relationships with external stakeholders and funders

METRICS

- metrics to evaluate the research itself,
 - metrics to evaluate the value of research development intervention,
 - metrics that the RD professional can use to apply to team science.
-
- -Acknowledgement: Holly J. Falk-Krzesinski, Ph.D.; Elsevier and Northwestern University

RESEARCH OUTCOMES

- Traditional academic metrics
 - papers, citations, and
 - evaluate normalization processes based on the cultural norms of different disciplines. *For example, astronomy or physics publications may commonly have 10 or more authors, where social sciences or humanities might typically have far fewer.*
- Processes of recognition or reward structure within Team Science projects.
- Attempts to apply fractional ownership.
 - precise – in that they represent appropriate distribution of discrete contributions – but are not likely to be accurate representations of the *value* of contributions.
- Future recognition frameworks.
 - Project CRediT (<http://casrai.org/credit>) has begun to approach this challenge by establishing a comprehensive contributor role schema to augment traditional use of authorship and its associated bibliometrics.
- However, there is still a risk that bibliometric approaches will continue to face challenges of ranked importance not unlike the status of first authorship, and different contributions being devalued by the group or by the evaluators.

TEAMING PROCESS

- Summative evaluation (e.g., satisfaction surveys)
- Formative evaluation (social network analysis, over time; reach not just size).
 - In addition, these evaluations can be both formal and informal – in fact; many summative evaluations can be developed by RD professionals somewhat independently from formal processes. You can take the pulse of the team, even if they don't put their wrists out.
- Summative, perception evaluations can be especially valuable for the RD professional in terms of understanding team function.

POTENTIAL CONSEQUENCES

- Significant changes to academic careers,
- General practice and effectiveness of science conducted at universities
- New models for recognition
 - create opportunities for more people to be better recognized for their engagement, not just as a participant, but for their contribution to the team's overall, collective success.
- Accurate recognition
 - viable pathways for ethnically, racially, gender and otherwise under-represented scientists to persist and gain leadership positions, realizing a commonly accepted goal of diversifying the scientific and academic corps.
- Finally, new models of recognition will create systems where the value of the whole is truly recognized as greater than only the sum of its parts.

HELP SCIENTISTS BUILD COLLABORATIONS

- Know who is doing what
 - Centralized vs. decentralized programs
 - Digital and in-person tools
 - Technology transfer collaborations
 - Institutional credibility

BUILD CROSS-DISCIPLINARY OR CROSS-INSTITUTIONAL BRIDGES

- *Incentivized* collaborations
- Create cross-disciplinary and cross field research concepts
 - Multi-disciplinary research opportunities
 - Mind-mapping tools
 - Coggle.it
- Areas of Excellence
- Discovery Slams/Lightning Talks
- Faculty/Staff Clubs
- Build relationships with external stakeholders and funders
 - Networking Events
 - Conferences

RESOURCES



- UC Team Retreat Website
 - <https://oru.research.ucsb.edu/teamscience/>
- “Team Science Tools for RD Professionals” : workshop at NORDP Wednesday 5/25; 10:15 a.m. (Presenter: Holly Falk-Krzesinski)
- Team Science Toolkit
 - <https://www.teamsciencetoolkit.cancer.gov/public/Home.aspx>

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QUESTIONS?

