

EXPANDING RECOGNITION & REWARD IN THE 21ST CENTURY:

A Focus on Promotion & Tenure Policy for Team Science

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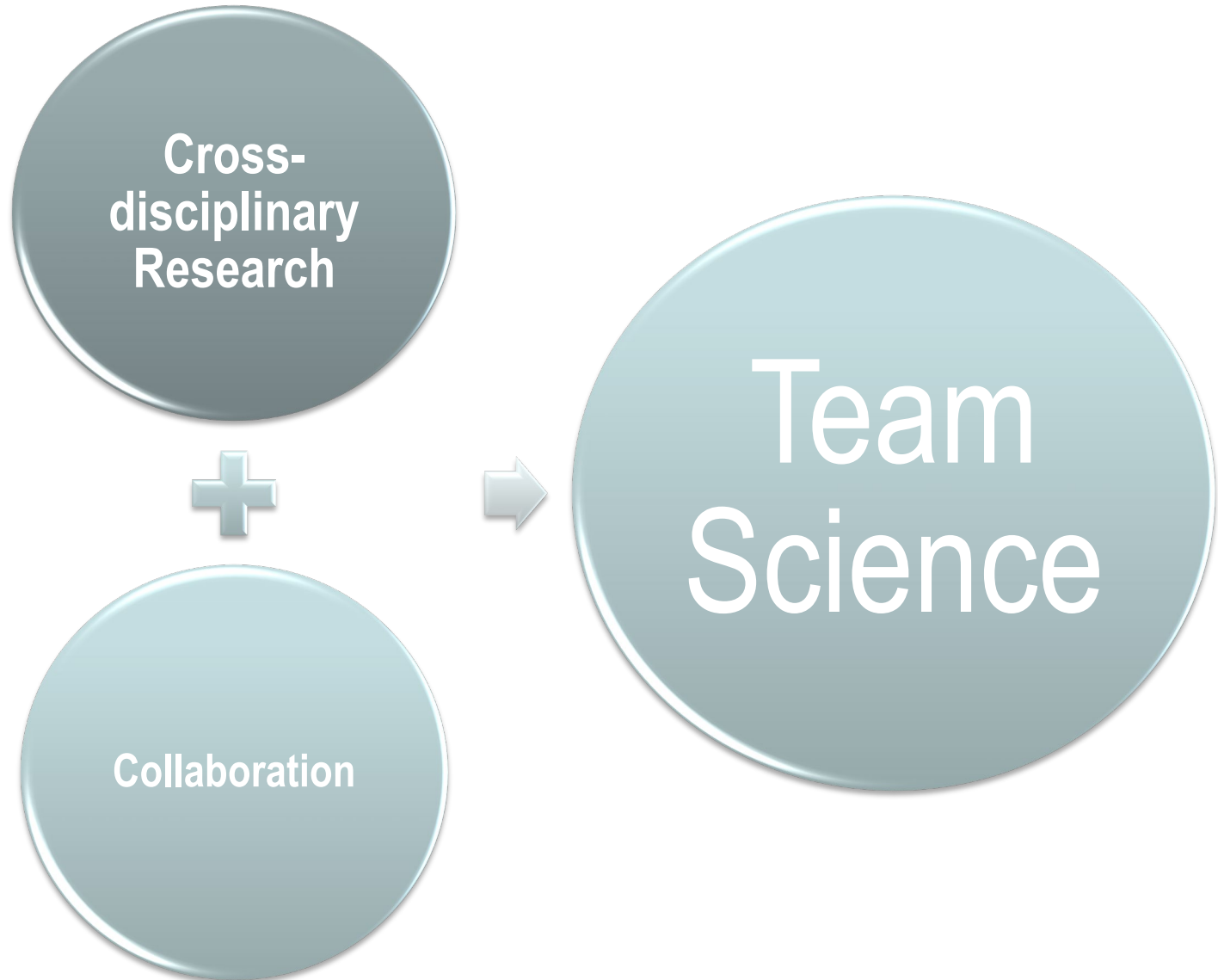
January 28, 2020



RUTGERS

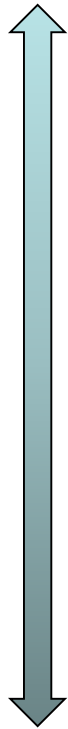
The State University of New Jersey

What is Team Science?!



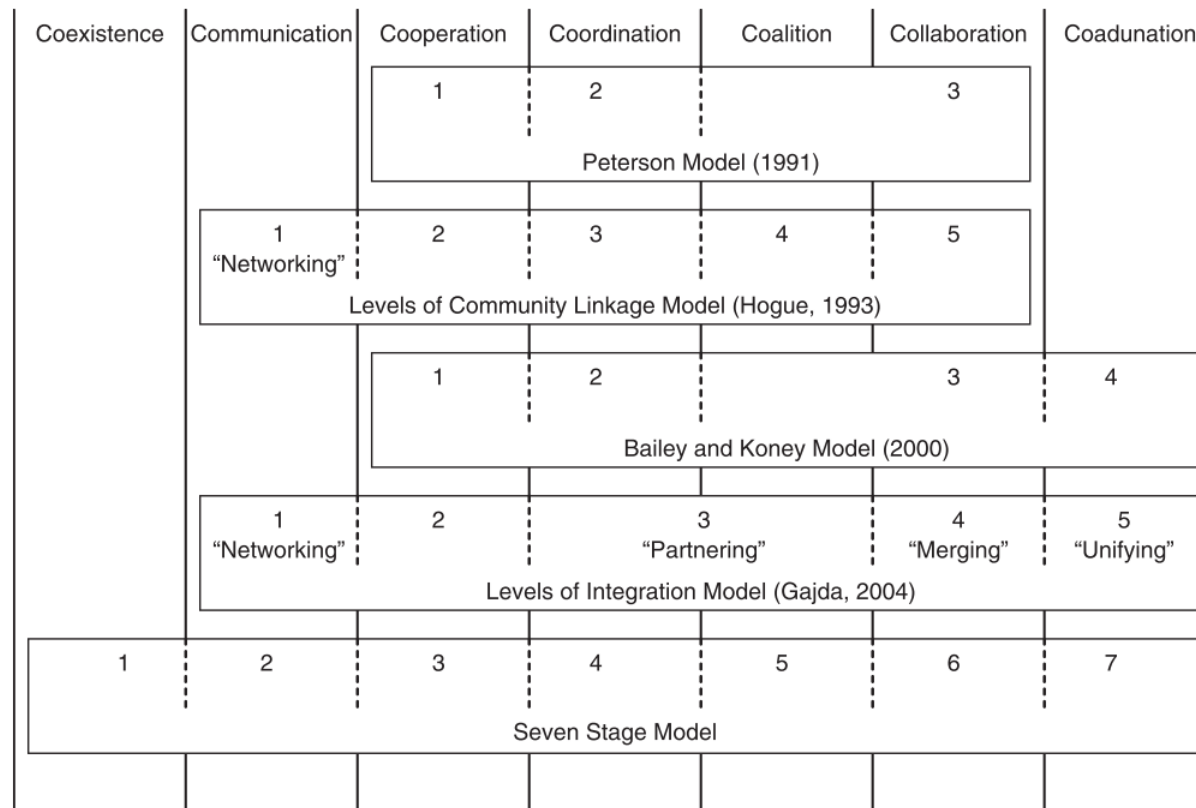
Cross-disciplinary Research

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



Collaboration

Figure 1
Stage Models of Collaboration



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 then that we **understand** the most effective practices for productive cross-disciplinary collaboration and team science
- So that we can train individual investigators, institutional leaders, and funding agencies to **employ** them

RECOGNITION & REWARD FOR TEAM SCIENCE

“We will need to find better ways to do team science and reward it if we are to solve large overarching problems. Everybody on the team needs to get the same big gaudy championship ring...”

- *AG Gilman. Silver Spoons and Other Personal Reflections. Annu. Rev. Pharmacol. Toxicol, 2012*

Go, Hawks, Go!

“Blackhawks' Stanley Cup rings will be handed out to **players, coaches, equipment managers, trainers and medical staff**...during a private ceremony.”



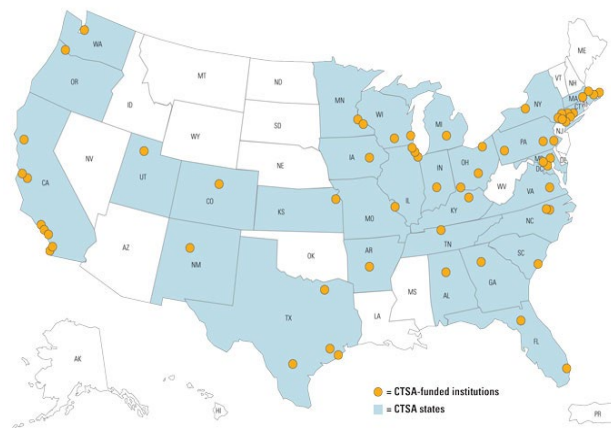
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Focus on Promotion & Tenure Policy

- **NAS Facilitating Interdisciplinary Research Report, 2004**
 - Academic survey respondents indicated that P&T criteria were the greatest impediment to interdisciplinary research in their campus
- **Council of Environmental Deans and Directors Report, 2005**
 - “Lured into the collaborative research needed for progress in an interdisciplinary field, scholars are later held to the standards of specific disciplines”
 - Need to develop new [recruitment, retention, promotion & tenure] procedures for handling interdisciplinary scholars
- **University of Chicago Academic Medical Center Study, 2008**
 - “Recognize all forms of scholarship as equally legitimate bases of academic tenure”
 - Subsequent change of P&T policy language that specifically addresses collaboration scholarship
- **Creating interdisciplinary campus cultures: A model for strength and sustainability, J. T. Klein, 2010**
 - Interdisciplinary career life cycle
 - Hiring, P&T
 - Ongoing faculty development

Examine P&T Policies Across a Consortium

- **60 NIH-funded CTSA Institutions**
 - “Enhancing Consortium-Wide Collaborations” mandate
 - In 30 states + DC
 - 21 Institutions ranked in the Top 50 by USNWR
 - Institutions with ~75% of all the NIH-funded researchers in the US, and about 60% of all the funded biomedical research in the world
 - 6 Independent Medical Schools/Academic Medical Centers
 - 1 Independent Research Institute
 - 32 AAU Institutions
 - 59 AAMC Institutions
 - 9 CIC* Institutions



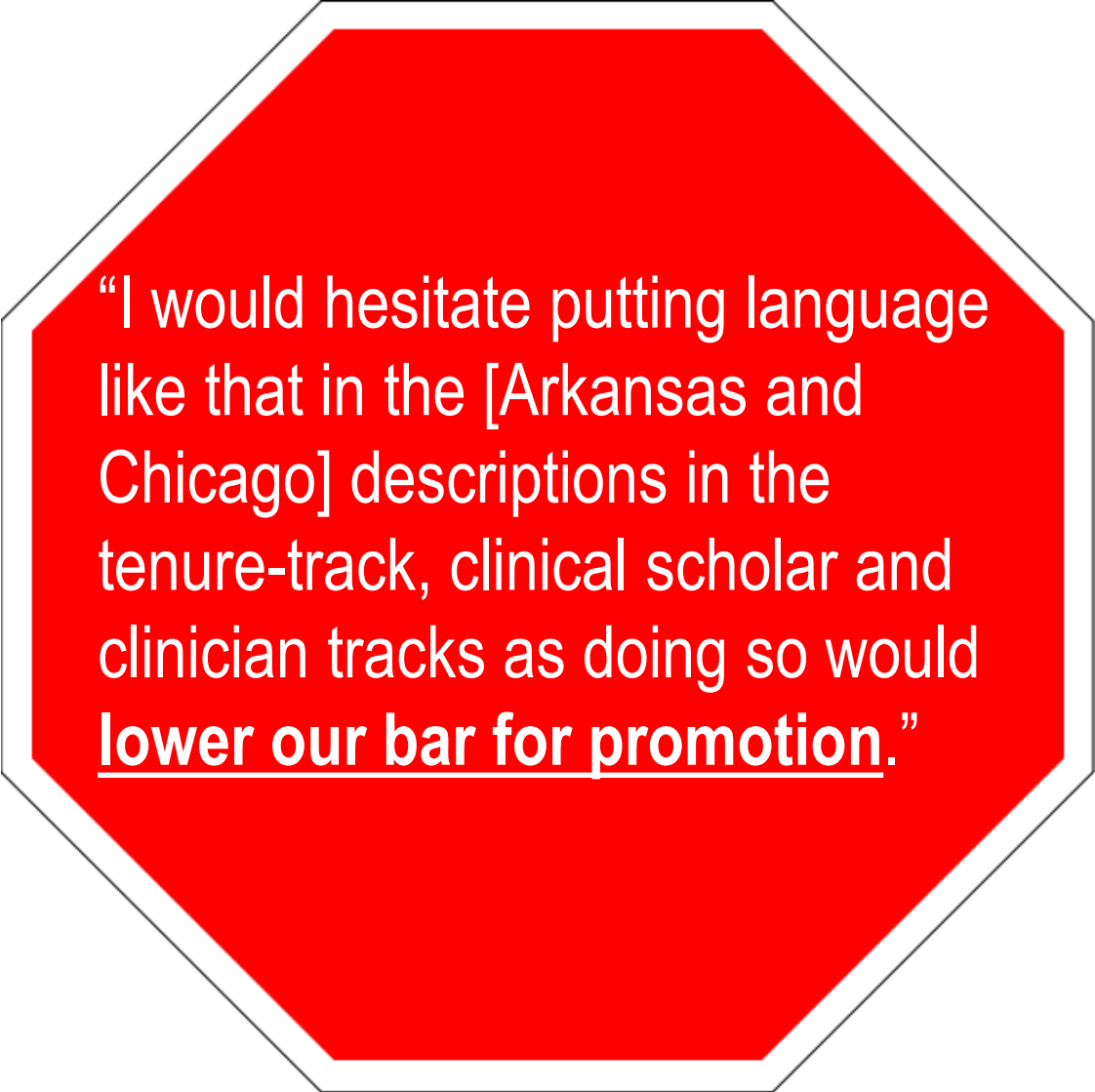
Team Science P&T Study - 2012

- **June 2012 via personalized email survey to Faculty Affairs Leadership**
 - Almost all P&T policies were behind firewalls and NOT publicly available
 - “I am interested to know if your **institution’s current APT policies or guidelines** include any specific language regarding **collaborations/collaborative activity, multi/interdisciplinary research and scholarship, and/or team science.**”
- **Central Admin**
 - Assistant Dean for Faculty Development; Senior Associate Dean for Faculty and Academic Affairs; Senior Vice Provost for Academic Affairs; Deputy Provost and Vice President for Faculty Affairs
- **Medical Schools**
 - Senior Associate Dean for Faculty & Academic Affairs; Executive Associate Dean for Faculty Affairs & Professional Development; Associate Provost, Faculty Affairs; Associate Vice Chancellor for Academic Affairs

The Responses

- **Responses from 43 institutions**
- **Central Admin and/or Medical School**
- **33 institutions shared policy excerpts**
- **Other responses**
 - Not applicable
 - Responded, but no such policy language exists
 - And one that may surprise you...

Still Resistance



“I would hesitate putting language like that in the [Arkansas and Chicago] descriptions in the tenure-track, clinical scholar and clinician tracks as doing so would lower our bar for promotion.”

The Analysis

- **Qualitative document analysis of the 33 policy excerpts**
 - Grounded theory approach, data marked with codes (open coding)
 - Codes were compared, contrasted, and sorted into larger themes (axial coding)
- **Overarching Emergent Themes**
 - Recognition of Team Science
 - Criteria for Evaluating Team Science
 - Process of Evaluating Team Science

NIH CTSA Requirements, 2014

- CTSA hubs **should advance team science and develop academic promotion criteria** that help create a viable career path for translational scientists.
- Applicants should plan for ways to identify best practices in team science, and to disseminate successful models
 - This should include consideration on how team scientists will be evaluated **in the academic promotion context**,
 - As well as **consideration of enhancing the professional experience for all members of a multi-disciplinary translational team**, not only the lead researcher.

Data Collection – 2016

- Re-surveyed institutions and evaluating new responses
- Used similar methodology
- Most policies now publicly available
- Comparing and extending initial responses from 2012

Revised Emergent Themes

<u>Theme Name</u>	<u>Theme Description (Brief)</u>
Acknowledgment	Acknowledgment of the growing prevalence, value, and/or importance of TS and/or ID research, and/or endorsement TS and/or ID research
Encouragement and Recognition	University encouragement and recognition of faculty engagement in TS/ID
Evaluation Criteria	Specific criteria for evaluation of TS and ID research contributions
Indicators	Indicators of criteria
Documentation & Process	Documentation of these indicators and evaluation processes
Institutional Support	Examples of institutional support for TS and/or ID research
Qualified Support	Qualified Support of TS and/or ID research

Acknowledgement

- **41% (22 of 54) of the policies acknowledge the growing prevalence, value, and/or importance of TS and/or ID research, and/or endorsement TS and/or ID research**
- **Some policy documents highlight how current ID/TS are generally becoming the “norm” or “reality” in science or supported by federal agencies**
- **In some cases the language is explicitly focused on IDR or TS or inclusive of both**

Encouragement and Recognition

- **41% (22 out of 54) of the university units included statements that encourage faculty to engage in TS/IDR and/or indicate that TS/ID research will be considered by APT committees**
- **A subset of these policy documents went further, setting expectations for faculty participation in TS and ID research through statements of explicit encouragement**

Evaluation Criteria

- **50% (27 out of 54) of the policy documents included criteria related to independence, reputation, leadership, and TS/IDR competencies for the evaluation of faculty engaged in TS/ID research**
- **In general APT policies include longstanding traditional criteria such as independence, reputation, leadership; nearly all of 27 documents discuss one or more of three criteria in the context of interdisciplinary and collaborative research activities, emphasizing the continuing focus on these criteria, whether in the context of independent or team-based activities**

Indicators

- 91% (49 of 54) of the policies included indicators for evaluation of TS and/or ID research contributions
- The indicators provided for documentation of these criteria (independence, reputation and leadership) were overlapping. Overall, the policies included the traditional indicators used for evaluation of solo and disciplinary research, including authorship position, research funding, and, in one instance, development of intellectual property.
- Some of the policies adjusted how these indicators should be interpreted in the context of TS or ID research
- In addition, some policies included novel indicators for TS and ID research including clarification of scientific contributions to a TS initiative, and documentation of TS competencies, such as unique abilities related to forming teams and/or developing formalized collaborations, as described below

Documentation & Processes

- **59% (32 of 54) of the policies included an explicit statement of indicators and or strategies related to the evaluation processes**
- **A focus on**
 - Sources of evidence
 - Guidelines for candidates and reviewers
 - Sample materials
 - Evaluation processes

Institutional Support

- **Only 11% (6 of 54) policies included statements demonstrating institutional commitment to TS and/or ID research, by describing institutional sources of support through systems, resources, and accommodations. These institutional supports help to “provide an intellectual climate that stimulates interdisciplinary research” and team science**
 - These policies described practices for budgeting and accounting and grant application preparation, as well as resources including seed funding, physical space, and funds for shared equipment, as well as commitments to an institutional culture supporting of TS and ID research
 - Explicit commitments of institutional support included: joint appointments, methods for distribution of indirect funds from research grants, and funds specifically designated for team science

Qualified Support

- **22% (12 of 54) of policies include language that qualifies/includes a cautionary note to Institutional Support approaches compared to other approaches, or questions the integrity of the various Institutional Support approaches**
- **Contradictory statements: Across institutions recognition of certain roles associated with team science may be conflicting, for instance one university unit highlights how roles such as being a core facilities director constitutes a relevant and acceptable contribution to scholarship, whereas another university unit describes the same roles as “meritorious but ordinarily not weighed heavily in establishing research excellence”**

Additional Themes

- **Time (1 of 54)**

- “If interdisciplinary work requires substantially longer start-up time than research in a single discipline, a request may be made, early in the probationary period, to consider an extension of that period...Such a request should include the recommendations of each of the relevant department chairs and deans.”

- **Mentorship (2 of 54)**

- “For scholars with an interdisciplinary bent, senior colleagues in a Center or Program may be sources of guidance.”
- “It is desirable that an interdisciplinary candidate have mentors in all appropriate units”

NIH CTSA Requirements, 2018

- CTSA Program hubs **must advance team science** and **develop academic promotion criteria** that help create a viable career path for translational scientists.
- The [CTSA] program focuses on widely appreciated **systematic barriers** including but not limited to:
 - **Incentives/credit for team science**
- Applicants should devise ways to identify best practices in team science, and to implement successful models.
 - A **major obstacle** to team science in academic health centers is the **traditional promotion and tenure process**, which is focused on individual accomplishment.
 - Therefore, applicants should describe **how team scientists will be evaluated in the academic promotion process**, as well as **consideration of how such individuals will be professionally recognized and thus incentivized to engage in collaborations**.

Incentives Through Recognition

- For team science, the goal is to **recognize and reward individual contributions** in a way that **encourages researchers to participate in team research**
- The use of **‘key’ positions on publications** and grants as the primary indicator of research performance, leadership and independence in team science projects should be **open, transparent, standardized and structured contribution information**



Author Contribution in P&T

“...scholarship is becoming increasingly collaborative or team-based. We ask that you accord individual and collaborative/team scholarship equal weight -- as long as the individual's contribution to collaborative/ team scholarship can be established. Please **disregard the position of authorship** as an indication of contribution to collaborative works unless YOU know it to be an accurate reflection.”

Contributorship: Project CRediT

- A high-level classification of the diverse roles performed in the work leading to a published research output in the sciences.
- 14 unique Contributor roles
 - When there are multiple people serving in the same role, a degree of contribution may optionally be specified as ‘lead’, ‘equal’, or ‘supporting’
- Purpose to provide **transparency in contributions** to scholarly published work, to enable improved systems of attribution, credit, and accountability, **especially for team science**

CRediT Taxonomy



At Cell Press we endorse the "CRediT" taxonomy of contributor roles and encourage authors to use this taxonomy when providing an Author Contributions section for research papers. Below, we provide the taxonomy as well as an example of a recent Author Contributions section reorganized to use this format. A recent paper by [Brand et al. \(2015\)](#) outlines the background for Project CRediT.

Term	Definition
Conceptualization	Ideas; formulation or evolution of overarching research goals and aims
Methodology	Development or design of methodology; creation of models
Software	Programming, software development, designing computer programs; implementation of the computer code and supporting algorithms; testing of existing code components
Validation	Verification, whether as a part of the activity or separate, of the overall replication/ reproducibility of results/experiments and other research outputs
Formal Analysis	Application of statistical, mathematical, computational, or other formal techniques to analyze or synthesize study data
Investigation	Conducting a research and investigation process, specifically performing the experiments, or data/evidence collection
Resources	Provision of study materials, reagents, materials, patients, laboratory samples, animals, instrumentation, computing resources, or other analysis tools
Data Curation	Management activities to annotate (produce metadata), scrub data and maintain research data (including software code, where it is necessary for interpreting the data itself) for initial use and later reuse
Writing – Original Draft	Preparation, creation and/or presentation of the published work, specifically writing the initial draft (including substantive translation)
Writing – Review & Editing	Preparation, creation and/or presentation of the published work by those from the original research group, specifically critical review, commentary or revision – including pre- or postpublication stages
Visualization	Preparation, creation and/or presentation of the published work, specifically visualization/ data presentation
Supervision	Oversight and leadership responsibility for the research activity planning and execution, including mentorship external to the core team
Project Administration	Management and coordination responsibility for the research activity planning and execution
Funding Acquisition	Acquisition of the financial support for the project leading to this publication.
Reproduced from Brand et al. (2015) , <i>Learned Publishing</i> 28(2), with permission of the authors.	

CRediT in Practice

- ▶ Example: standard use of taxonomy
(<http://dx.doi.org/10.1016/j.cels.2016.01.013>)

- **Conceptualization**, I.G.J. and B.P.W.; **Methodology**, I.G.J.; **Software**, I.G.J.; **Validation**, I.G.J.; **Formal Analysis**, I.G.J.; **Investigation**, I.G.J. and B.P.W.; **Resources**, I.G.J.; **Data Curation**, I.G.J. and B.P.W.; **Writing – Original Draft**, I.G.J. and B.P.W.; **Writing – Review & Editing**, I.G.J. and B.P.W.; **Visualization**, I.G.J.

- ▶ Example: taxonomy with author-provided customizations
(<http://dx.doi.org/10.1016/j.cub.2015.12.071>)
- **Conceptualization**, A.D., M.L., and M.L.B.; **Methodology and Investigation**, A.D. and C.M.W. (phylogenetics); **Methodology and Investigation**, H.F.J., A.D. (quantitative real-time PCR), J.M.H., and A.D. (snail microscopy and pharmacology); **Methodology and Investigation**, D.J.J. (WMISH), R.B., and F.Y. (FISH, with help from A.D. and M.M.L.); **Methodology and Investigation**, A.D. and M.M.L. (BAC walk, with BioS&T); **Methodology and Investigation**, G.S.M. and M.L. (laboratory - frog); **Methodology and Investigation**, A.D. and S.C. (Japan fieldwork); **Methodology and Investigation**, A.D., C.M.W., D.J.J., G.D.K., J.W.D., M.L.B., P.H., and F.V.R. (bioinformatics); **Writing – Original draft**, A.D. and M.L.B.; **Writing – Review & Editing**, A.D., C.M.W., D.J.J., G.S.M., G.D.K., H.F.J., J.M.H., M.M.L., M.L., and M.L.B. **Supervision and Data Analysis**, A.D., M.L., and M.L.B.; **Discovered the mutation**, A.D. *The order in which G.S.M. and J.M.H. appear in the author list was decided by a “best of three” coin toss.*

Credit for CRediT

Q7 In your view, what is the likelihood that the CRediT taxonomy will be recognized by the appointment, promotion, or tenure system of review at the institution(s) with which you are affiliated?

Answered: 35 Skipped: 3

	Extremely likely	Very likely	Neither likely nor unlikely	Not very likely	Extremely unlikely	N/A	Total	Weighted Average
(no label)	5.71% 2	31.43% 11	34.29% 12	20.00% 7	8.57% 3	0.00% 0	35	2.94

Reward & Recognition for 21st Century Research

- **Recognizing and rewarding the full and diverse range of outputs, products, and activities and the way research is conducted**
 - Interdisciplinary, Societally-focused, Collaborative and team-based, Open, Digital, Reproducible
- **Follow the funders:**
 - NIH Biosketch section on “Contributions to Science” and ‘research products’ that goes beyond only publications, including e.g., preprints
 - NSF Biosketch sections on both “Products” and “Synergistic Activities”

Reference Library

Mendeley Desktop

File Edit View Tools Help

Add Folders Related Sync Help

Research data policies & practices

Research Data Sharing

Research Methodologies Profiles & Finding Collabora...

Science of Team Science (SciTS)

Authorship, Coauthorship, Publishing Issues

Bibliometrics, Scientometrics, Informetrics & SNA

CAHS Team Science Study

Cognition and Learning in Collaborations

Collaboration Literature

Collaboration Readiness and Integrity in Collaboration

Communication & Knowledge Exchange_Integration

Community Research & Team Science

Conflict Management, Resolution, and Team Intervention

Convergence

CTSA Developing Measures for Assessing and Improving ...

Distributed Collaboration_Virtual Teams ICTS

Economics of Collaboration

Educational Aspects/Teaching Interdisciplinarity

Ethics/RCR & Team Science

Evaluating IDR_Collaboration_Team Science

Funding and Grants

Gender & Diversity Issues in Collaboration and TS

Global Health

Innovation, Creativity & Entrepreneurship in Team Science

Interdisciplinarity (list collated March 2016)

Interdisciplinary Research, TS and SciTS

International_Global Collaboration

Joint Appointments

Leadership, Coaching and Team Composition

Measuring Interdisciplinarity

Multilevel Analysis

Must Read

Organizational & Institutional Issues

Physical Infrastructure to Support Team Science

Productivity

Research Centers

Reward & Recognition_Promotion and Tenure

Scientometrics/Informetrics/Team Science

Team Assembly and Dynamics

Team Measurement Scales

Team Processes

Reward & Recognition_Promotion and Tenure in Science of Team...

Overview Documents Members

★	Authors	Title
★	Klein, Julie Thompson; Falk-Krzesinski, Holly J.	Interdisciplinary and collaborative work: Framing promotion and tenure practices and policies
★	Choucri, Nazli; Weck, Olivier de; Moavenzadeh, Fred	Promotion and Tenure for Interdisciplinary Junior Faculty
★	Klein, Julie Thompson; Falk-Krzesinski, Holly J.	Interdisciplinary and collaborative work: Framing promotion and tenure practices and policies
★	Canadian Academy of Health Sciences	Academic Recognition of Team Science: How to Optimize Canadian Academic System
★	Klein, Julie Thompson; Banack, Amanda; Falk-Krzesinski, Holly J.	Promotion and Tenure in Interdisciplinary Team Science: Introductory Literature Review
★	Rikakis, Thanassis	Innovative faculty evaluation criteria for incentivizing impact interdisciplinary collaboration
★	Disis, Mary L; Slattery, John T	The Road We Must Take: Multidisciplinary Team Science
★	Pfirman, Stephanie; Martin, Paul; Berry, Leonard; Fletcher, National Research Council	Enhancing the Effectiveness of Team Science
★	Antes, A.L.; Mart, Adeline; DuBois, J.M.	Are Leadership and Management Essential for Good? An Interview Study of Genetic Researchers
★	Cassuto, Leonard	The Changing Face of Scientific Collaboration
★	McGlynn, Terry	The Credit System in Science is Outdated
★	Paul-Hus, Adèle; Desrochers, Nadine; Rijkse, Sarah de; Russell, J.	The Reward System of Science: Special Issue
★	Derrick, Edward G; Falk-Krzesinski, Holly J; Roberts, M...	Facilitating Interdisciplinary Research and Education: Practical Guide
★	Jeschke, Jonathan M; Kaushal, Sujay S; Tockner, Klemens	Diversifying Skills and Promoting Teamwork in Science
★	University of Virginia School of Medicine, Faculty Affairs and ...	Promotion and Tenure Policy
★	University of Southern California, Joint Provost-Acad...	Guidelines for Assigning Authorship and for Attributing Contributions to Research Products and Creative Works
★	Nora, L M; Pomeroy, C; Curry, T E; Hill, N S; Tibbs, P a; Wilf...	Revising appointment, promotion, and tenure procedures: incorporate an expanded definition of scholarship: the Guidelines: Faculty Appointment, Promotion, and Tenure
★	Texas A&M Health Science Center	Guidelines: Faculty Appointment, Promotion, and Tenure
★	Duke University	Interdisciplinary Studies at Duke
★	Harvard University Medical School	Authorship Guidelines
★	George Washington University School of Medicine and Health...	Faculty Guide for Appointments, Promotions, and Tenure
★	The Academy of Medical Sciences	Improving recognition of team science contributions in the

PUBLIC GROUP

Science of Team Science (SciTS) Edit

Social Sciences Edit

[Invite members](#)

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About group Edit

A forum to promote cross-disciplinary and inter-professional knowledge transfer around team science, scientific collaboration, and the science of team science research, a powerful evidence-base for effective practices.

<https://www.mendeley.com/commu...>

Group admins

[Holly Falk-Krzesinski](#) Owner

[Explore members](#)

Research note

Interdisciplinary and collaborative work: Framing promotion and tenure practices and policies

Julie Thompson Klein^{1,2}, Holly J. Falk-Krzesinski^{1,2}

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²Global Academic Relations, Elsevier
³School of Professional Studies, Northwestern University

Research note

Interdisciplinary and collaborative work are keywords for change in the 21st century. Both, however, face challenges across the entire academic system, from administrative policies and budget formulas to disciplinary cultures of research and education. This Research Note is the first synthesis of findings from literature and models for practices and policies that recognize interdisciplinary and collaborative work in the promotion and tenure (P&T) process, brought together in a table of recommendations. Creating a culture of reward requires consistency, alignment, and comprehensiveness at all stages and levels of evaluation, from defining expectations in the initial appointment to preparing individual candidates' dossiers to incorporating appropriate criteria. Several organizations have led the way in formulating recommendations for recognizing interdisciplinary and collaborative work. Professional societies and academic administrators at local levels are also providing leadership. Institution-wide policies are rare though diverse. Most often individual units are issuing guidelines for appropriate evaluation. A number of studies have also called for widening definitions of what counts for consideration, including innovative, applied, and commercial research and development. The overriding issue to emerge is the importance of a systematic and informed approach.

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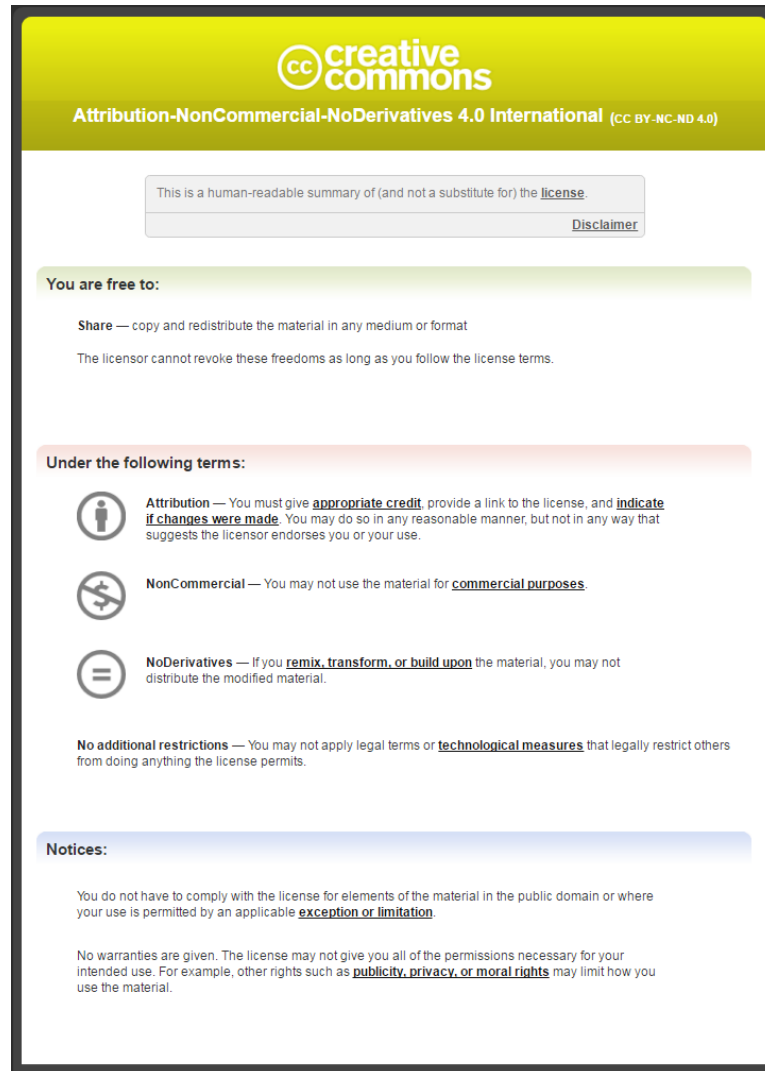
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