DEFINING A COLLECTIVE MISSION AND VISION

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GW Libraries and Academic Innovation

OBJECTIVES

- To Introduce a “pipeline” approach to Team Science
- To Explore “some” of the ways TS is working to inform scientific teaming
- To Highlight a resource-rich presentation

- *All in 20 minutes….*

"The goals of the Accelerating Research through International Network-to-Network Collaborations (AccelNet) program are to accelerate the process of scientific discovery and prepare the next generation of U.S. researchers for multiteam international collaborations.. "

- *The SCIENCE (of teams): Transcends disciplinary perspectives and professions and enables development and application of new methodologic or conceptual frameworks.*

- *The SCIENTISTS (of teams): Change their identity and how they view themselves; that is, no longer tied to a particular disciplinary identity.*

Stephen Fiore, University of Central Florida

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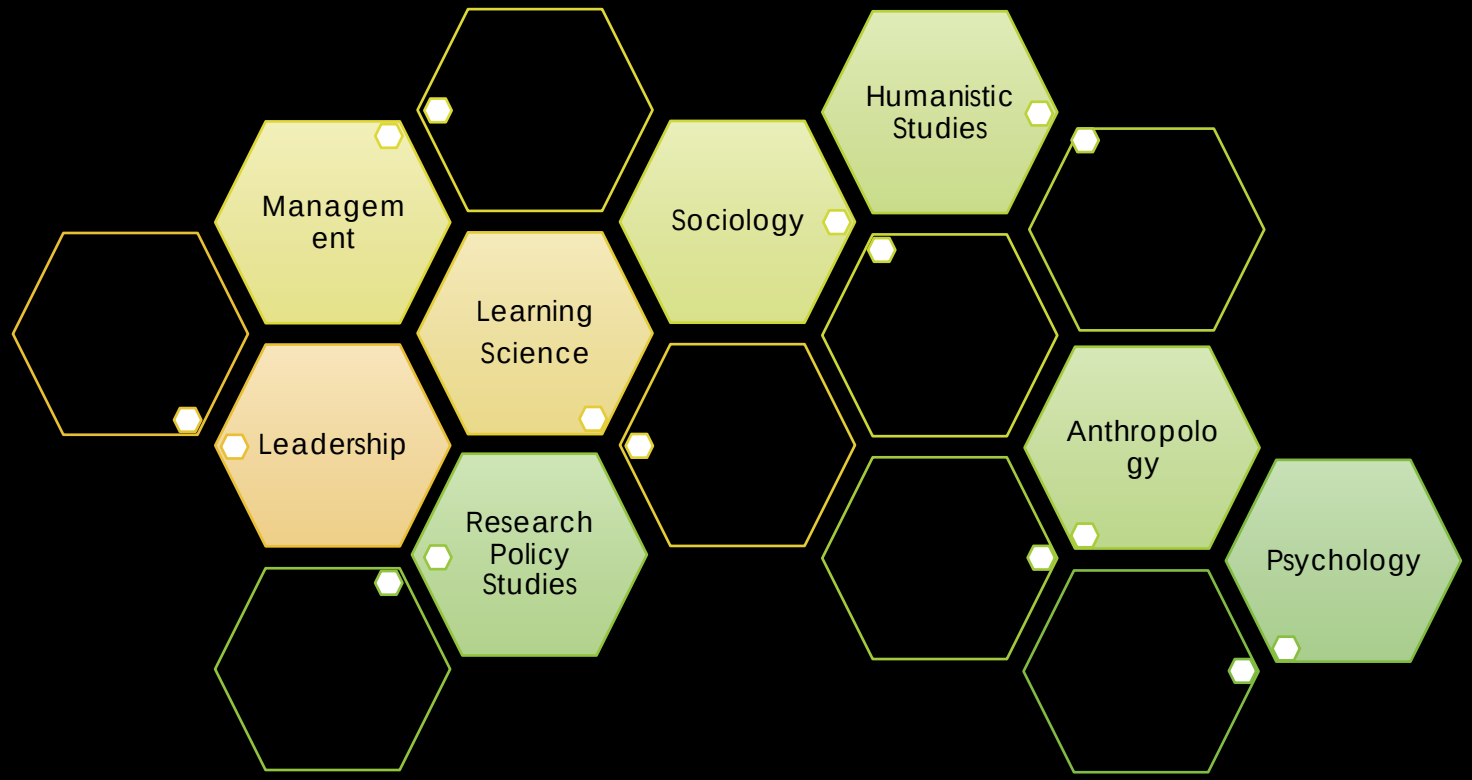
THE TS INTER-DISCIPLINE



MENDELEY

www.mendeley.com/groups/3556001

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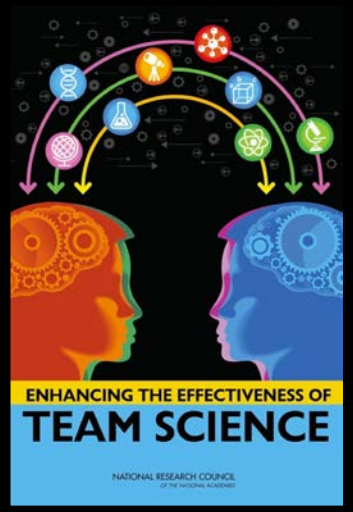
DEFINING TEAM SCIENCE

- Team science – Scientific collaboration, i.e., research conducted by more than one individual in an interdependent fashion, including research conducted by small teams and larger groups.

- The Science-of-Team-Science— provide cumulative empirical knowledge to assist scientists, administrators, funding agencies, and policy makers in improving the effectiveness of team science.



Cooke, N., & Hilton, M. (2015). *Enhancing the effectiveness of team science* . Washington, D.C: The National Academies Press.

Revolutionary Shifts in Science

Future of Work

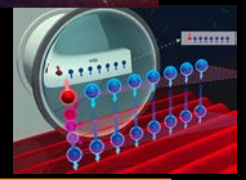
Windows on the Universe

Convergence Research

Understanding the Rules of Life

Harnessing the Data Revolution

NSF



Quantum Leap

Mid-Scale Research Infrastructures

NSF Includes

Navigating the New Arctic

NSF 2026

What are Knowledge Producing Teams (KPTs)?

Are groups of scientific collaborators with shared and/or aligning mental models (Cannon-Bowers, Salas & Converse 1993)

Contain unique aspects because of expectations from the knowledge-generating environment in which they operate (National Academy of Science 2015).

Primarily aim to create knowledge not ordinarily achieved outside of a collaborative environment

Have task-oriented goals, share equipment and technologies, and develop professional and interpersonal relationships within their unique context and content situations (Mohammed & Dumville 2001)

Lotrecchiano, G., Mallinson, T., Leblanc-Beaudoin, T., Schwartz, L., Lazar, D., & Falk-Krzesinski, H. (2016). Individual motivation and threat indicators of collaboration readiness in scientific knowledge producing teams: a scoping review and domain analysis. *Heliyon*, *2*(5), e00105. https://doi.org/10.1016/j.heliyon.2016.e00105

What are Knowledge Producing Teams (KPTs)?

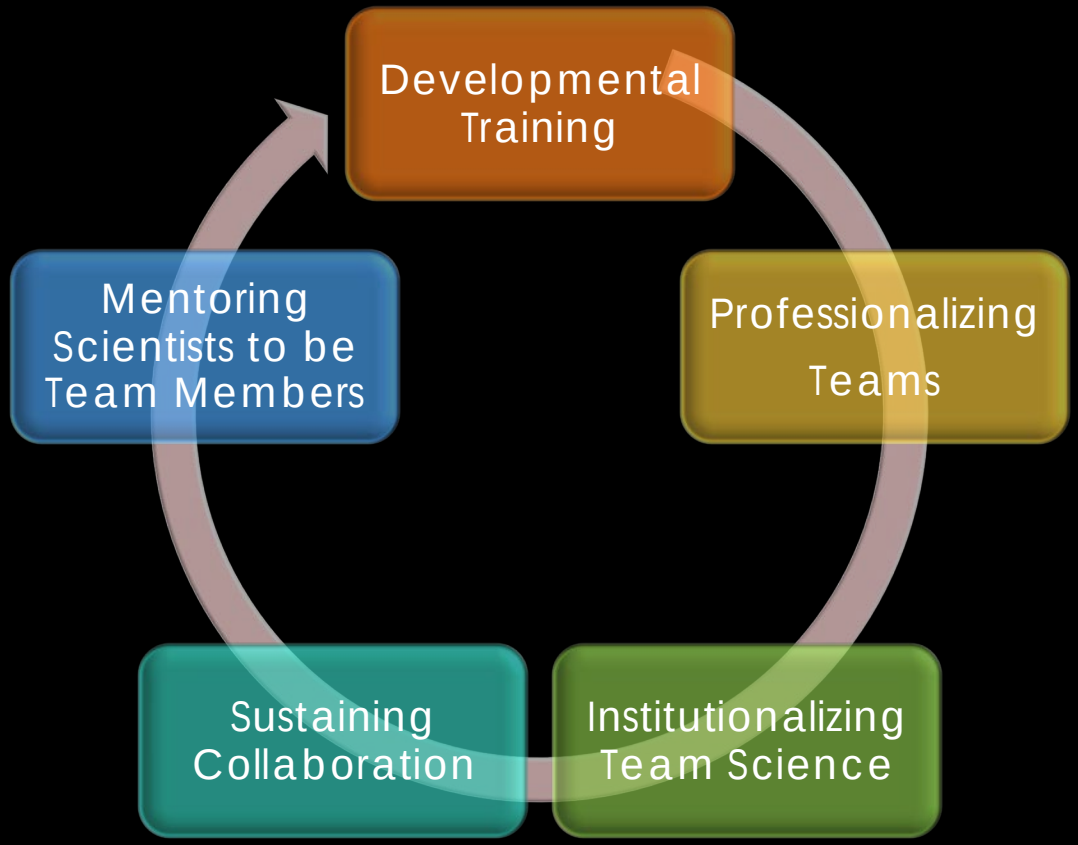
Are embedded within the **teaming process** (DeChurch & Mesmer-Magnus 2010) that grounds their purpose.

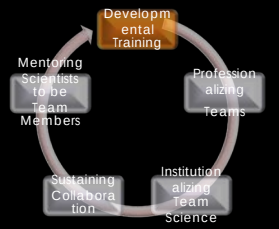
Have members are typified as collections of **highly skilled, autonomous workers trained to use specific tools and theoretical concepts with goals that produce complex, intangible, and tangible results** (Bisch-Sijtsema et al. 2011)

Require **sustainability** of projects and the alliances of these knowledge workers depend upon the continued successful collaborative motivations of individual contributors (Andreas et al. 2006)

Lotrecchiano, G., Mallinson, T., Leblanc-Beaudoin, T., Schwartz, L., Lazar, D., & Falk-Krzesinski, H. (2016). Individual motivation and threat indicators of collaboration readiness in scientific knowledge producing teams: a scoping review and domain analysis. *Heliyon*, *2*(5), e00105. https://doi.org/10.1016/j.heliyon.2016.e00105

THE TEAM SCIENCE PIPELINE





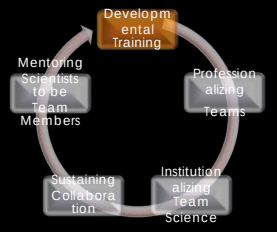
Developmental Training

OBJECTIVES

- Training New Scientists
- Engaging, Rewarding and Assessing Teams in the Learning Environment
- Team Development amidst Individual Development

CHALLENGES

- Designing measures of team engagement while using other individual measures of disciplinary competency
- Create objectives around teaming as set of core skills needed for scientific success.
- Integrating team based measurement along with individual measures of academic mastery.



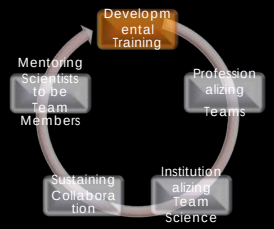
Developmental Training

*Comprehensive Assessment of Team Member Effectiveness (CATME)

Meta-Categories (p.626)

- Contributing to the Team's Work
- Interacting With Team
- Keeping the Team on Track
- Expecting Quality
- Having Relevant Knowledge. Skills, and Abilities (KSAs)

Ohland, M., Loughry, M., Woehr, D., Bullard, L., & Felder, R. (2012). The comprehensive assessment of team member effectiveness development of a behaviorally anchored rating scale for self- and peer evaluation. *Academy of Management Learning & Education : AMLE*, *11*(4), 609–630. https://doi.org/10.5465/amle.2010.0177



Developmental Training

PROJECTS TO FOLLOW:

- Center for Leading Innovation and Collaboration

Domain Task Force Sub Committee for Translational Team Science Competencies

CLIC Center for Leading Innovation & Collaboration

SESYNC NATIONAL SOCIO-ENVIRONMENTAL SYNTHESIS CENTER

- Collaborations with SESYNC on developing Core Competencies for Team Science

- Team Science Education and Training Facebook

Team Science Education and Training

- Special Interest SIG (Team Science Training)

INSciTS Building the knowledge base for effective team science
International Network for the Science of Team Science

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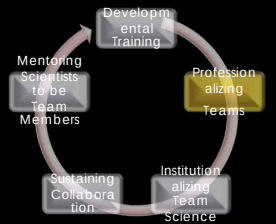

Professionalizing Teams

OBJECTIVES

- Establishing Professionals in Professions
- Creating reward systems that are *in tune* with science team values and individual needs
- Creating Pathways for Team Scientists

CHALLENGES

- Collaborations occur more in strategic disciplines that are application oriented than in basic disciplines, and they focus on practical problems.
- Lack of incentives in the reward system and pressure to build individual reputations result in minimizing or outright penalizing individuals' contributions.

Klein, J., & Falk-Krzesinski, H. (2017). Interdisciplinary and collaborative work: Framing promotion and tenure practices and policies. *Research Policy*, *46*(6), 1055–1061. https://doi.org/10.1016/j.respol.2017.03.001

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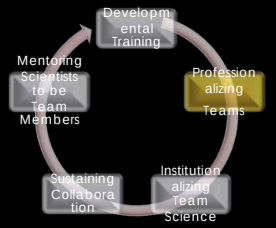
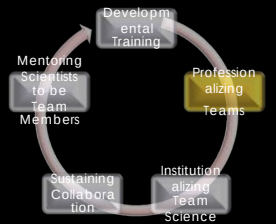


Professionalizing Teams

- Creating a culture of reward is a comprehensive approach that spans the career life cycle, from hiring through pre-tenure and tenure review, and subsequent stages of promotion.
- Recommendations
  - Taking Preliminary Steps
  - Revising Existing Practices and Policies
  - Writing New Guidelines
  - Preparing A Dossier for Promotion and Tenure
  - Advancing Support in Professional Organizations

Klein, J., & Falk-Krzesinski, H. (2017). Interdisciplinary and collaborative work: Framing promotion and tenure practices and policies. *Research Policy*, *46*(6), 1055–1061. https://doi.org/10.1016/j.respol.2017.03.001



Professionalizing Teams

INSciTS Building the knowledge base for effective team science
International Network for the Science of Team Science

- InSciTS Special Interest Group (Fostering Team Science In Academia)
- *Adèle Paul-Hus, Nadine Desrochers, Sarah de Rijcke, Alexander D. Rushforth, (2017) "The reward system of science", Aslib Journal of Information Management, Vol. 69 Issue: 5, pp.478-485, https://doi.org/10.1108/AJIM-07-2017-0168
- Key Exemplars referenced in Klein and Falk-Krzesinski (2017)
  - American Psychological Association
    - Advocates for mentorship that BOTH encourages individual reputation along with teaming
  - University of Kentucky's College of Medicine
    - Advocate Boyer's multi-scholarship model
  - George Washington University
    - Clarifying and encouraging cross-stakeholder engagement

emeraldinsight

UK College of Medicine

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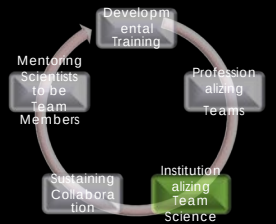


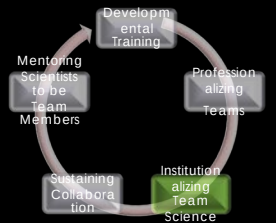
Institutionalizing Team Science

OBJECTIVES

- Team science as normative for conducting science.
- Funder and Funding priorities
- Rewarding Research Teaming
- Rewarding Translational Science

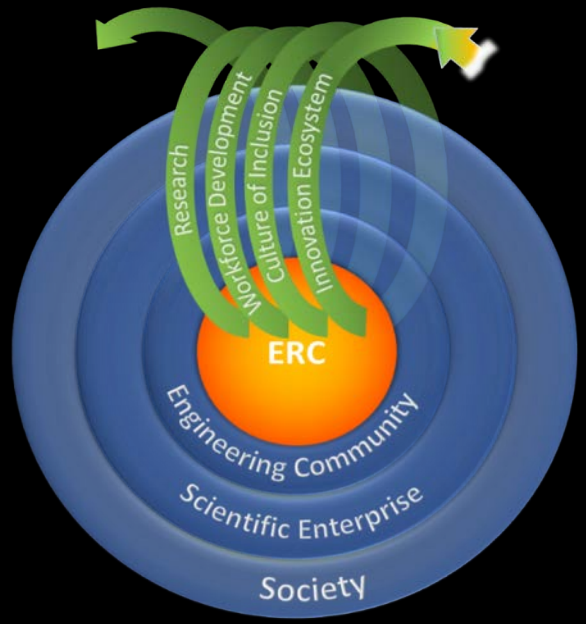
CHALLENGES

- Establishing funding streams that reward science conducted in teams.
- Developing metrics for evaluation leading to funding.

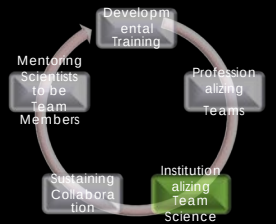


Institutionalizing Team Science

NEW NSF ERC PROGRAM MODEL



- 4 interconnected foundational components
  - Research
  - Workforce Development
  - Culture of Inclusion
  - Innovation Ecosystem
- Multi-layer impact
  - Engineering Community
  - Scientific Enterprise
  - Society



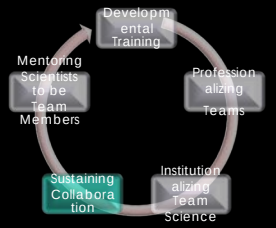
Institutionalizing Team Science

RESOURCES

- NSF (Convergence Research)

- Research driven by a specific and compelling problem. Research requiring a convergence paradigm is generally inspired by the need to address a specific challenge or opportunity, whether it arises from deep scientific questions or pressing societal needs.

- Deep integration across disciplines. As experts from different disciplines pursue common research challenges, their knowledge, theories, methods, data, research communities and languages become increasingly intermingled or integrated. New frameworks, paradigms or disciplines can form from sustained interactions across multiple communities.



Sustaining Collaboration

OBJECTIVES

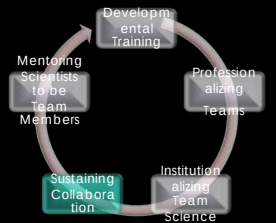
- Embrace Team Science Values
- Sensitize Team Readiness
- Measure Organizational Readiness

CHALLENGES

- Continual and Ongoing Encouragement for Teaming as a normative vehicle for advancing Science
- Measurement and Evidence that supports teaming knowledge, skills, and attitudes
- Utilizing TS Scholarly and Practical Materials

RESOURCES

Team Science Toolkit



Sustaining Collaboration

- Toolkits (Major Repository of information-Team Science)
  - https://www.teamsciencetoolkit.cancer.gov/Public/Home.aspx
- Learning Tools
  - COALESCE (CTSA Online Assistance for LEveraging the Science of Collaborative Effort)http://teamscience.net/
  - http://toolbox-project.org/toolbox-team/ (Micheal O'Rourke et al.)

COALESCE CTSA Online Assistance for LEveraging the Science of Collaborative Effort

toolbox

- Measurement Tools
  - Collaborative Productivity Scale. Hall, KL, Stokols, D, Moser, RP, Taylor, BK, Thornquist, MD, Nebeling, LC, et al. (2008). The Collaboration Readiness of Transdiscplinary Research Teams and Centers. *American Journal of Preventive Medicine*, 35(2S), S161-172.
  - The Transdisciplinary Orientation Scale: Factor Structure and Relation to the Integrative Quality and Scope of Scientific Publications Misra S, Stokols D, Cheng L (2015) The Transdisciplinary Orientation Scale: Factor Structure and Relation to the Integrative Quality and Scope of Scientific Publications. *J Transl Med Epidemiol* 3(2): 1042.
  - MATRICx. Motivation Assessment for Team Readiness, Integration, and Collaboration (Lotrecchiano, GR, Mallinson, TR et al.) www.MATRICx.net

MATRICx

- Field Guides
  - Collaboration and Team Science Field Guide (Bennett, Gadlin, and Levine, 2018)
  - https://www.cancer.gov/about-nci/organization/crs/research-initiatives/team-science-field-guide

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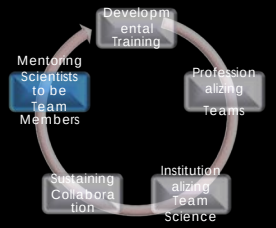


Mentoring Team Members

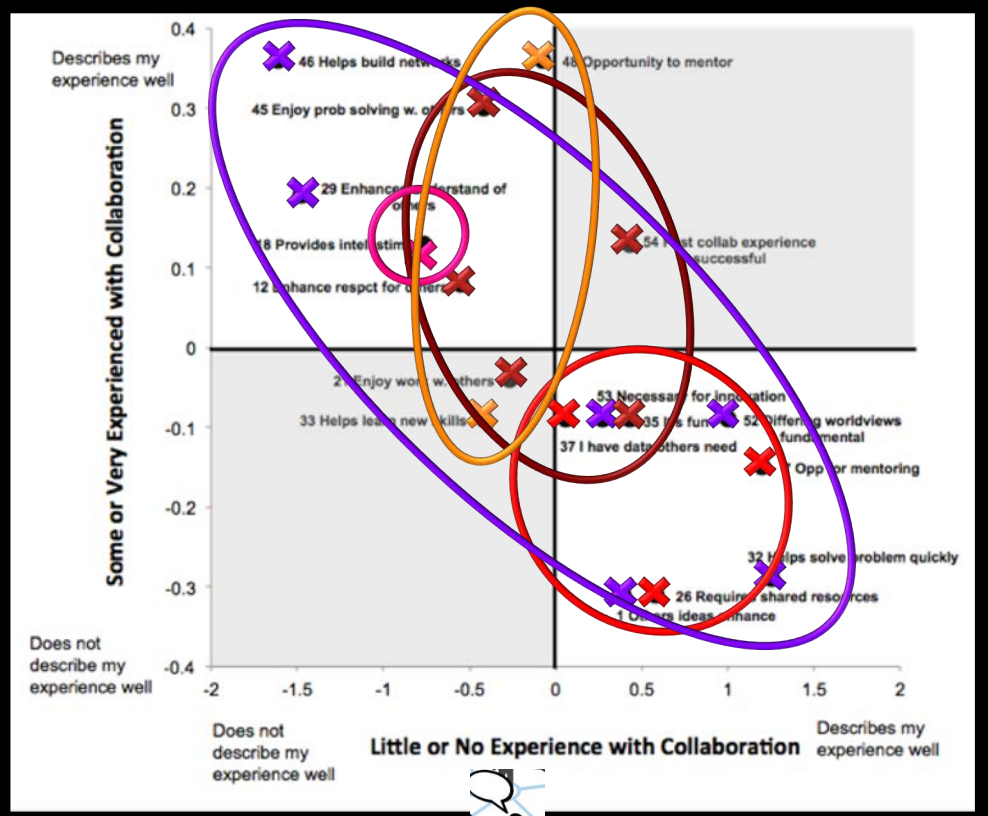
OBJECTIVES

- Feeding back into the system
- New Skills
- Understanding new skill requirements
- Leveraging Decision Making

CHALLENGE

- Understanding the mentor/mentee relationship and how it has changed
- Understanding Diverse Motivations for teaming
- Advancing skills that were not part of one's (traditional) career development.

RESOURCES



MATRICx

Advancing Science

Building Relationships

Knowledge Transfer

Resource Acquisition

Maintenance of Beliefs

Recognition and Reward

Lotrecchiano GR, Mallinson T, LeBlanc-Beaudoin T, Schwartz L, Lazar D, Falk-Krzesinski, H (2016). Individual motivation and threat indicators of collaboration readiness in scientific knowledge producing teams: A scoping review and domain analysis *Heliyon 2*(5), e00105.

Mallinson, T, Lotrecchiano, GR, Furniss, J, Schwartz, L, Lazar, D, Falk-Krzesinski, HJ (2016). Pilot analysis of the Motivation Assessment for Team Readiness, Integration, and Collaboration (MATRICx) using Rasch analysis. *Journal of Investigative Medicine 64,* 1186-1193.

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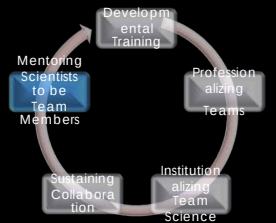
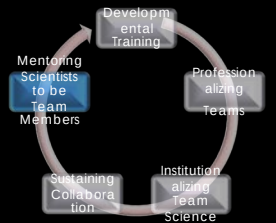


Mentoring Team Members

STRUCTURAL SYSTEM COMPLEXITIES

Feature	Skill Development Foci
Complex problem solving	• A heightened focus on anticipated future states [Hirsch Hadorn G et al, 2007; Weisbord M , 2004) • Goal alignment with conditions of a changing world (Entin E et al., 1999) • Focus on dealing with interpersonal team challenges • Co-developed shared mental models within KPTs (Cannon-Bowers J et al., 1993) • Social learning as part of team engagement (Schwandt D, 2008)
Stakeholder involvement	• Translation of knowledge across disciplines (Colditz G et al., 2012) • Development and sustainability of scientific and non-scientific partnerships (Maasen S and Lieven O, 2006) • Establishing interdependence between knowledge partners (Lawrence P, Lorsch J,, 1967)
Methodological pluralism	• Boundary spanning over boundary forming (Klein J, 2004) • Shifting awareness of problems (Nicolescu B, 2005) • Pluralism as a normative reality (Lamont M and Swidler A, 2014) • Translation of knowledge (Larson E et al., 2001)
Praxis	• Experience-based learning is necessary for impact-based solutions (Kolb, D, 1984) • Combining formal and informal knowledge (Horlick-Jones, T et al., 2004) • Reintegrating co-created knowledge (Lang et al, 2012)

Perspective. *Informing Science The International Journal of an Emerging Transdiscipline*, *21*, 051–074. Retrieved from https://doaj.org/article/d30c3143178349c39f4df43df3ca7e81



Mentoring Team Members

INTERACTIVE SYSTEM COMPLEXITIES

Feature	Skill Development Foci
Open systems capacity	• Reception to knowledge from outside of one's system of knowledge (Tress et al., 2003) • Conflict and power struggles can breed innovative thought (Eldridge J and Crombie A, 1975) • Interdependent relationships between actors need to contribute to shared goals (Katz D and Kahn R, 1966)
Different (shifting) levels of reality	• Navigation of multiple realities related to a single problem (McGregor S, 2011, Nicolescu, 2006) • Mastering the consideration of diversity over different timescales, landscapes, and experiential episodes (Cilliers P , 2013) • Adaptation through self-organization (Heylighen F, 2008)
Collaborative construction and reconstruction	• Openness to rearranging collaborative and knowledge arrangements (Balsiger P, 2004) • Direct contact with those affected by the problem attempting to be solved (Klein, 2004)

Perspective. *Informing Science The International Journal of an Emerging Transdiscipline*, *21*, 051–074. Retrieved from https://doaj.org/article/d30c3143178349c39f4df43df3ca7e81

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THANK YOU

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International Network for the Science of Team Science

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