

# Team Science: Fostering Collaboration Among Difference

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**COLLEGE OF AGRICULTURE AND LIFE SCIENCES**  
**AGRICULTURAL, LEADERSHIP,  
AND COMMUNITY EDUCATION**  
**VIRGINIA TECH.**

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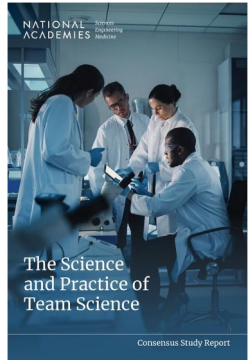
“You see people who think it’s not much more than stapling a bunch of CVs to the back of a proposal. They don’t realize that it takes time to build a relationship.”

(Excerpt from *Nature* article by Heidi Ledford, 2015)

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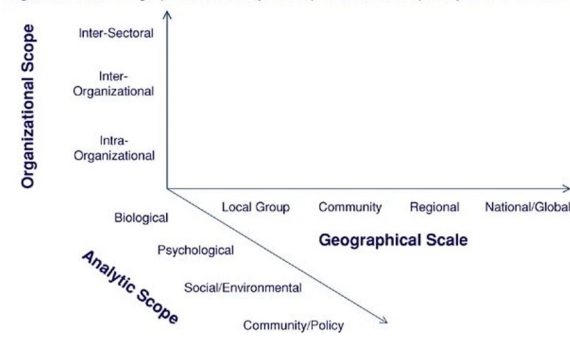
## Framing Team Science

“Team science, **defined as collaborative, interdependent research conducted by more than one individual**, is becoming the norm as it often involves integrating scientific approaches to solve problems that are multifaceted, multidimensional, interdependent, and do not have a single answer. Critically, team science includes project teams and more complicated collections of researchers, such as multiteam systems that operate within research centers, initiatives, and networks. Team science also considers the engagement of input beyond researchers, such as community members and leaders, policymakers and other decision-makers, caregivers, health care providers, and research administrative professionals.” (National Academies, 2025, p. 11)



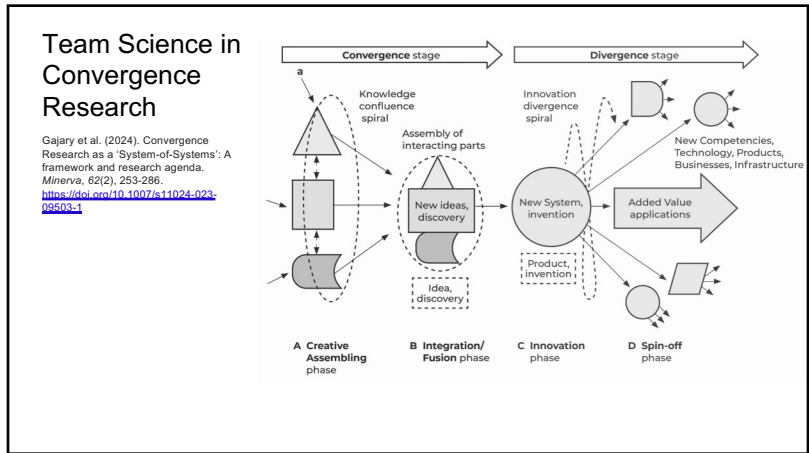
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### Organizational, Geographic, and Analytic Scope of Transdisciplinary Action Research



Stokols, D. (2006). Toward a science of transdisciplinary action research. *American journal of community psychology*, 38, 63-77. <https://doi.org/10.1007/s10464-006-9060-5>

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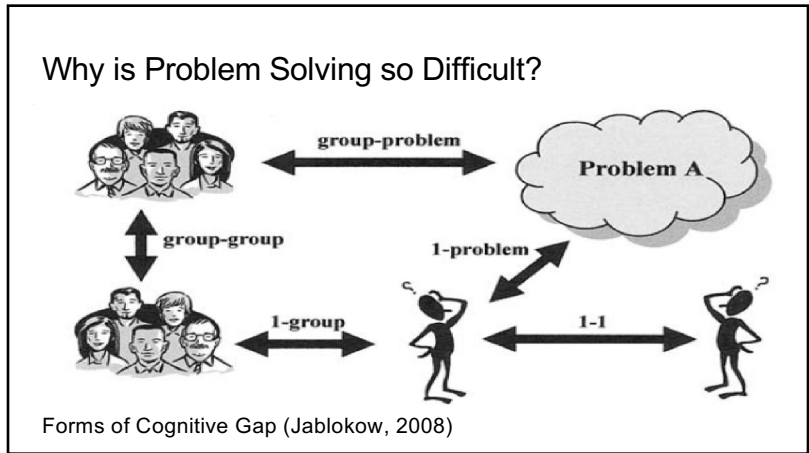
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### Key Facts on Team Science

(National Academies, 2025)

- Teams Are More Varied and Distributed
- Scientific Teams Transform Across Key Phases
- Best Practices Must Be Iterative
- Technology Is Powerful, But Not a Panacea
- Team Science Needs Its Own Evidence Base

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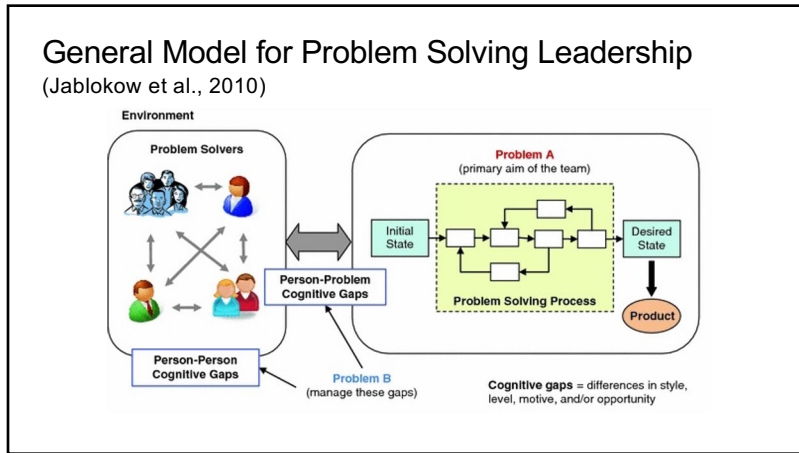
### The Diversity Paradox

“Friction is essential for arriving at the best solutions.”  
(NeuroLeadership Institute, 2018)

**“Diverse groups are more creative. They feel more uncomfortable, and that discomfort motivates them to do extra preparation and share new information.”**

WorkLife / ADAM GRANT

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**Why Leadership Outweighs an Interdisciplinary Mix in the Effectiveness of a Research Team**

Gigliotti et al. (2024), "Assessments of working group effectiveness in the planning of the New Jersey Kids Study: An applied mixed-methods study on the science of team science" (<https://doi.org/10.1017/cls.2024.576>)

"Extra effort may be needed to bridge differences in team members' backgrounds to enhance the effectiveness of diverse teams."

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### Provisional Planning & Cross-Boundary Teaming

SciTS Conf

- Those involved in provisional planning are more likely to submit external grant proposals, publish together, and publish in higher impact journals (Salazar, 2022).
- Cross-boundary teams are more likely to collaborate on future publications, even when their grant proposals are unfunded (Contractor et al., 2022).


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### Characteristics, potentials, and challenges of transdisciplinary research

One Earth

(Lawrence et al., 2022, <https://doi.org/10.1016/j.oneear.2021.12.010>)

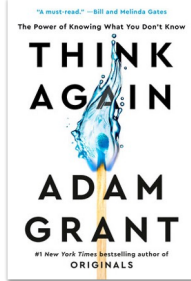
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## WE ALL HAVE BLIND SPOTS

The bigger you are the bigger your blind-spots

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## QUESTIONING THE KNOWN

“Thinking like a scientist involves more than just reacting with an open mind. It means being actively open-minded.”

— Adam Grant

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## Strategies to Improve Team Science

(National Academies, 2025)



- **Development stage:** careful team assembly that reflects a task analysis, consideration of the team composition, attention to the orientation of new members, and development of a shared language.
- **Conceptualization stage:** development of a team charter, deliberative team planning and project design, and attention to a shared mental model of the team's work.
- **Implementation stage:** systematic project management, regular team debriefs to identify what went well and what went poorly at each stage and to determine the best ways for the next project stage.
- **Translation stage:** working with community members and attention to external as well as internal validity, that is, understanding of the generalizability of the research findings.

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Team-emergent competency domain	Components	Specific observable behaviors	Relevant training
<b>Team management</b>	<ul style="list-style-type: none"> <li>• Shared visioning</li> <li>• Clear roles and responsibilities</li> <li>• Effective project management</li> </ul>	<ul style="list-style-type: none"> <li>• Develop project plans via Collaboration Planning</li> <li>• Use visualizations (e.g., Timelines and Gantt charts)</li> <li>• Manage meetings with discipline and strategy</li> </ul>	<ul style="list-style-type: none"> <li>• Team science fundamentals</li> <li>• Collaboration Planning</li> <li>• Basics of project management</li> </ul>
<b>Communication</b>	<ul style="list-style-type: none"> <li>• Transactive memory systems</li> <li>• Shared mental models</li> </ul>	<ul style="list-style-type: none"> <li>• Develop organizational charts and central repository systems</li> <li>• Hold one-on-one check-ins</li> <li>• Facilitate the exchange of expertise among team members</li> </ul>	<ul style="list-style-type: none"> <li>• Project management documentation</li> <li>• Knowledge brokering</li> </ul>
<b>Collaborative problem-solving</b>	<ul style="list-style-type: none"> <li>• Trans-disciplinarity</li> <li>• Collective intelligence</li> <li>• Learning/adaptation</li> </ul>	<ul style="list-style-type: none"> <li>• Use visualizations to facilitate collaborative approaches to data analysis</li> <li>• Conduct regular team debriefs</li> </ul>	<ul style="list-style-type: none"> <li>• Facilitation skills</li> <li>• Agile practices</li> <li>• Team debriefs</li> </ul>
<b>Affect</b>	<ul style="list-style-type: none"> <li>• Trust</li> <li>• Cohesion</li> <li>• Psychological safety</li> </ul>	<ul style="list-style-type: none"> <li>• Meet one-on-one with each project partner to learn about unique priorities and perspectives</li> <li>• Ensure everyone has had a chance to contribute to important discussions</li> <li>• Share constructive and compassionate feedback with all team members</li> </ul>	<ul style="list-style-type: none"> <li>• Relationship building</li> <li>• Active listening, gratitude, and humility</li> </ul>
<b>Leadership</b>	<ul style="list-style-type: none"> <li>• Goal setting</li> <li>• Sense-making</li> <li>• Networking</li> <li>• Conflict resolution</li> </ul>	<ul style="list-style-type: none"> <li>• Facilitate shared goal setting and keep team aligned with shared vision</li> <li>• Prioritize needs of team members</li> <li>• Connect project partners with needed resources</li> </ul>	<ul style="list-style-type: none"> <li>• Leading without authority</li> <li>• Servant leadership</li> <li>• Needs based conflict resolution</li> </ul>

Sweeney, W. A., Hernandez, M., Burnside, E. S., Hintzke, J., Lemmon, K., & Brasier, A. R. (2025). Beyond deadlines and deliverables: Identifying barriers and facilitators to enhance the PROMICE of translational teams. *Journal of Clinical and Translational Science*, 9(1), e102. <https://doi.org/10.1017/cts.2025.64>

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**Transdisciplinary learning trajectories: Developing action and attitude in interplay**

Horn, A., Visser, M. W., Pittens, C. A., Urias, E., Zweekhorst, M., & van Dijk, G. M. (2024). Transdisciplinary learning trajectories: developing action and attitude in interplay. *Humanities and Social Sciences Communications*, 11(1), 1-13. <https://doi.org/10.1057/s41599-023-02541-w>

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**What Google Learned from Its Quest to Build the Perfect Team** (Duhigg, 2016)

nyt mag

**'If a company wants to outstrip its competitors, it needs to influence not only how people work but also how they work together.'**

More at: [nytimes.com/magazine](https://www.nytimes.com/magazine)  
Illustration by James Graham

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**Insight's from Google's Project Aristotle** (Rozovsky, 2015)

*Who is on a team matters less than how the team members interact, structure their work, and view their contributions.*

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**Psychological Safety Over Time** (Marlow et al., 2024)

1. "Team-level psychological safety climate emerges through consensus of individual perceptions of psychological safety over time."
2. "The greater the degree of early information sharing, the quicker individuals reach consensus on psychological safety climate."
3. "The average level of psychological safety is not stable once consensus has been reached: it begins at a relatively high level and declines over time."

Marlow, S. L., Lacerenza, C. N., & Salas, E. (2024). Examining how psychological safety consensus emerges over time. *Small Group Research*, 10464964241288221. <https://doi.org/10.1177/10464964241288221>

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## Stop Wasting Money on Team Building

(September, 2018, *Harvard Business Review*)



Dominant theme from research and interviews with 125 teams:  
 “I really like and value my teammates. And I know we should collaborate more. We just don’t.”

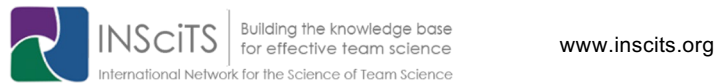
Conclusion: “We learned that to get people to work together, we had to let them figure out how that would actually improve results.”

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## Amy Edmondson on Teaming



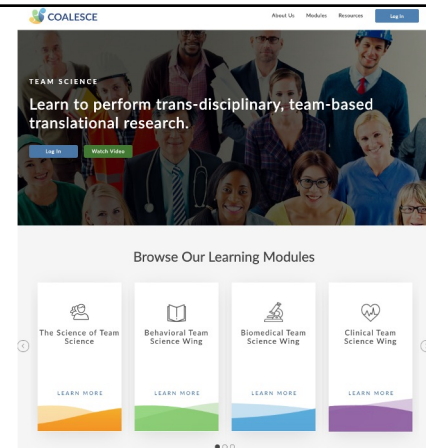
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How might you make use of resources available through Northwestern Medicine’s Team Science Community Toolkit?

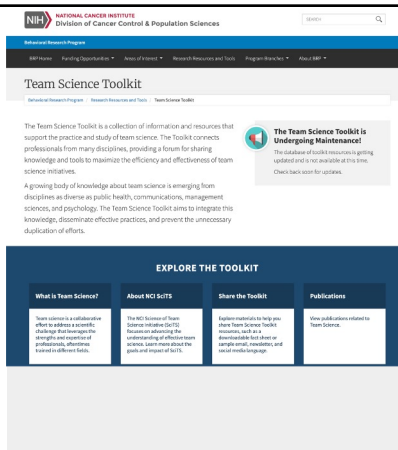
<https://www.teamscience.net/>



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How might you make use of resources available through the National Cancer Institute Team Science Toolkit?

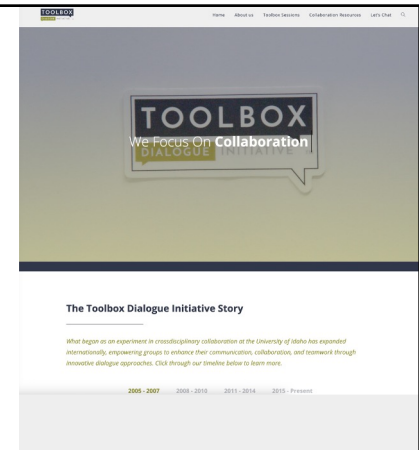
<https://cancercontrol.cancer.gov/brp/research/team-science-toolkit>



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How might you make use of resources available through the Toolbox Dialogue Initiative?

<https://tdi.msu.edu/>



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What insights or wonderings are emerging for you?

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