

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

## Interdisciplinary Research

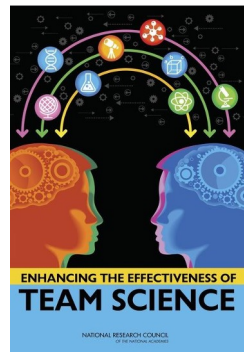
How it looks in ALCE

Presented by  
 Eric Kaufman, PhD

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### Changing Research Environment


"Over the past six decades, as scientific and social challenges have become more complex and scientific knowledge and methods have advanced, scientists have increasingly joined with colleagues in collaborative research referred to as team science."  
 (National Research Council, 2015, p. 1)



ENHANCING THE EFFECTIVENESS OF  
**TEAM SCIENCE**  
 NATIONAL RESEARCH COUNCIL  
OF SCIENTIFIC AND TECHNICAL ADVISORS

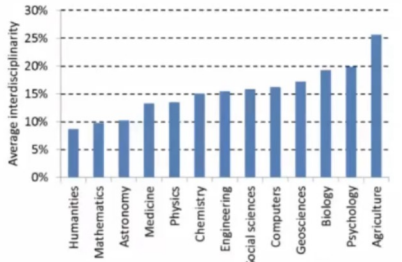
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### Agriculture Research Tends Toward Interdisciplinarity



2022 Plenary: Dr. Staša Milojević - Small vs. Big Teams - (Fundamental) Differences in Formation Mechanisms and Roles

Level of Interdisciplinarity in 13 Broad Fields (Milojević, 2022)



Field	Average Interdisciplinarity (%)
Humanities	~8
Mathematics	~10
Astronomy	~10
Medicine	~13
Physics	~14
Chemistry	~15
Engineering	~15
Social sciences	~16
Computers	~16
Geosciences	~17
Biology	~18
Psychology	~20
Agriculture	~25

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### In What Ways is ALCE Interdisciplinary?



Think interdisciplinary. Think iScience.

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### Moving From I-Shaped to T-Shaped

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### Are We Building VT-Shaped Students?

How might ALCE contribute to this vision?

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### When is Our Approach Comb-Shaped?

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### Perhaps ALCE's Value is X-Shaped

"The X-shaped learner moves in the transdisciplinary space where learning includes interdisciplinarity with a participatory approach and a more holistic focus on a common goal" (Doig, 2020, para. 10).

**I-Shaped (Disciplinary)**

- In-depth knowledge of skills in one discipline

**T-Shaped (Multi-disciplinary)**

- In-depth knowledge and skills which can be applied across different disciplines

**X-Shaped (Trans-disciplinary)**

- Various knowledge and skills in one discipline paired with knowledge and skills in leadership

**CHANGE FOR THE WORKER: Expertise Shifts: The I to the T to the X**

DISCIPLINARY	MULTI-DISCIPLINARY (T-Shaped)	TRANS-DISCIPLINARY (Human-Machine + Disciplinary Convergence)

Stocks of Knowledge\* (Educated) → Flows of Knowledge\* (Learning Agility)

\*Stocks and Flows of Knowledge (Luhn Heigl, Detalle)

www.healthermcspowan.com | www.futurelearning.com

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### Can We Strive to Be Tree-Shaped?

The diagram illustrates two models of skill development. On the left, 'Tee-Shaped Skills' are represented by a T-shaped tool with a vertical stem labeled 'DEPTH' and a horizontal top labeled 'BREADTH'. On the right, 'Tree-Shaped Skills' are represented by a tree with a trunk labeled 'DEPTH' and a canopy labeled 'BREADTH'. A vertical double-headed arrow on the far right is labeled 'HEIGHT', indicating that both models aim for high skill levels. A small text note at the bottom reads: 'To use this diagram: "Tree Shaped Designers" by Steve Harte, c/o Lee Symonides, Kaynor Architects, 2013 December 06, Toronto, Ontario, Canada. This image adapted from Shutterstock image ID: 63729362 by One'.

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Example from Samson Adeoye's Award-winning Presentation at the 2023 Leading Change Conference

The diagram is a circular framework for leadership. At the center is a 'Hybridized Framework' which includes 'Ethical Leadership' and 'Leadership-as-Practice'. This central core is surrounded by four main components: 'New Learning' (top-left), 'Adaptive Leadership' (top), 'Collaborative Work' (bottom), and 'Policy Implementation' (bottom). The outer ring of the diagram is labeled 'Embrace Uncertainty'. Arrows indicate a clockwise flow between these components. A photograph of Samson Adeoye and Eric Kaufman is shown in the bottom left corner of the slide.

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### Opportunities with RIVERE<sup>SM</sup> Ecological Center

The slide features the RIVERE logo, which consists of a stylized green plant above blue wavy lines representing water, with the word 'RIVERE' in blue capital letters below. To the right is a photograph of a modern, multi-story building with large glass windows and a dark facade. A small inset photograph shows a woman with blonde hair wearing a blue button-down shirt.

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### ALCE Centers

The slide displays the 'ALCE Centers' branding. It includes the 'kai' logo (three stylized figures) and the 'VT CENTER FOR COOPERATIVE PROBLEM SOLVING VIRGINIA TECH' logo. There are three photographs: a woman presenting at a meeting, a group of people sitting around a table in a meeting room, and a woman standing next to a market stall filled with fresh produce like asparagus and tomatoes.

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### The five keys to a successful Google team

(Rozovsky, 2015)

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

- 1 **Psychological Safety**  
Team members feel safe to take risks and be vulnerable in front of each other.
- 2 **Dependability**  
Team members get things done on time and meet Google's high bar for excellence.
- 3 **Structure & Clarity**  
Team members have clear roles, plans, and goals.
- 4 **Meaning**  
Work is personally important to team members.
- 5 **Impact**  
Team members think their work matters and creates change.

re:Work

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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

TED

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### Un-doing Understanding

The Backwards Brain Bicycle - Smarter Every Day 133

Video at:  
<https://ed.ted.com/featured/bf2mRAfC>

What might this tell us about how we need to approach interdisciplinary team science?

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### ALCE 5224: Team Science, Cooperation, and Interdisciplinary Work

- Analyze the theoretical, conceptual, and practical underpinnings for **building capacity around team science**, cooperative processes, and interdisciplinary research, programming, and outreach.
- **Evaluate current scholarship** on team science and cooperative processes in interdisciplinary contexts.
- Evaluate the readiness of individuals and teams to **effectively engage** in cooperative processes in interdisciplinary contexts.
- **Analyze the effectiveness** of team and cooperative group structures, protocols, and processes in interdisciplinary research, programming, and outreach.
- **Construct training** designed to build team science and cooperative process capacity in interdisciplinary research, programming, and outreach.
- Analyze and evaluate the team science and **cooperative process outputs** and outcomes of interdisciplinary research, programming, and outreach.

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### ALCE 5224 Textbooks & Resources

AMY C. EDMONDSON JEAN-FRANÇOIS HARVEY  
EXTREME TEAMING  
LESSONS IN COMPLEX, CROSS-SECTOR LEADERSHIP

King L. Hall · Amanda L. Vogel  
Robert T. Croyle Editors  
Strategies for Team Science Success  
Handbook of Evidence-Based Principles for Cross-Disciplinary Science and Practical Lessons Learned from Health Researchers  
Springer

SCIENCE FOR WORK



TED TALKS  
IDEAS WORTH SPREADING



SMALL GROUP COMMUNICATION  
Forming & Sustaining Teams

THE COLLABORATIVE TEAM SCIENCE  
FIELD GUIDE

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### Options for Completing ALCE 5224 in 2023-24

<u>Fall Semester</u>	<u>Spring Semester</u>
Face-to-Face Class Meetings	Online, Asynchronous
MWF, 11:15am-12:05pm	
CRN 91672	



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### Questions? Ideas?

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