Transdisciplinary Approaches to **Advanced Technology in Society**

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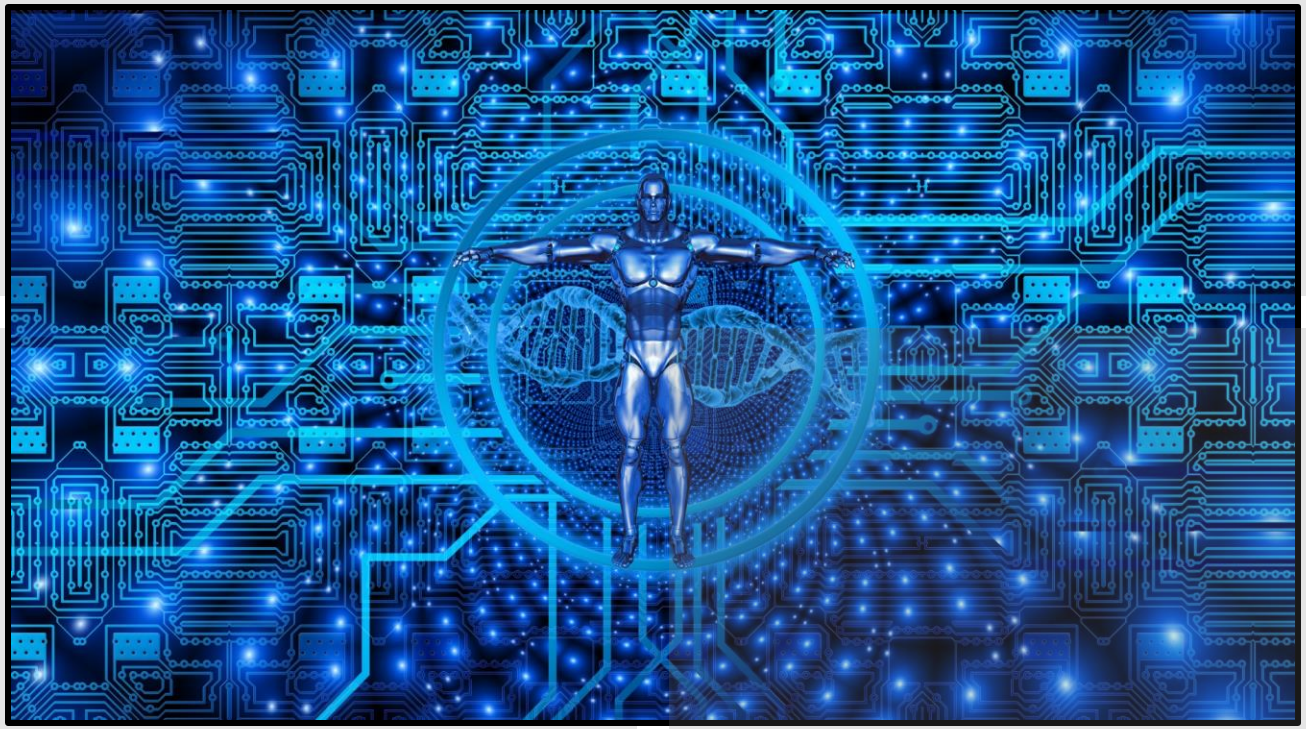

Nicholas C. Zingale, PhD

EDT Conference

June 24, 2021

Meet the "future" President of the University of Rijeka

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Advanced Technology in Society

- Is still being defined
- Includes the “sylicarbon future”
- Asks big questions about the future of life

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Advanced Technology in Society's "Sylicarbon Future"

- Human-Machine Connections
- Artificial Intelligence (AI)
- Extended Reality (XR)

  Augmented Reality (AR) | Virtual Reality (VR) | User Experience (UX)

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Advanced Technology in Society's "Sylicarbon Future"

Case Western Reserve research team from new Human Fusions institute aims for $10 million Avatar XPrize competition; winner will best 'transport a human's sense, actions and presence' to another place

In 15 years at Case Western Reserv
physical touch—the "essence of th

That drive has led to groundbrea
body's nervous system to provi

Most notably, Tyler and his te
touch to a prosthesis so an
tomato—fundamentally c

Now Tyler, the Kent H. S
Case School of Enginee

The New York Times

To Stem Suicide and Sexual Assault, the Air Force Dons Headsets

Officials are hoping that an immersive virtual reality experience aimed at getting airmen to intervene will succeed where years of traditional training have failed.

Beyond synthetic biology, synthetic ecology boosts health by engineering the environment

by Kat J. McAlpine, Boston University

In a new *Nature Communications* study, researchers from BU's Microb

There's a lot of interest right now in how different microbiomes—like the one made up of all the bacteria in our guts—could be harnessed to boost human health and cure disease. But Daniel Segrè has set his sights on a much more ambitious vision for how the microbiome could be manipulated for good: "To help

Artificial intelligence to predict heart disease

31 MAY 2021 | 2 MINS

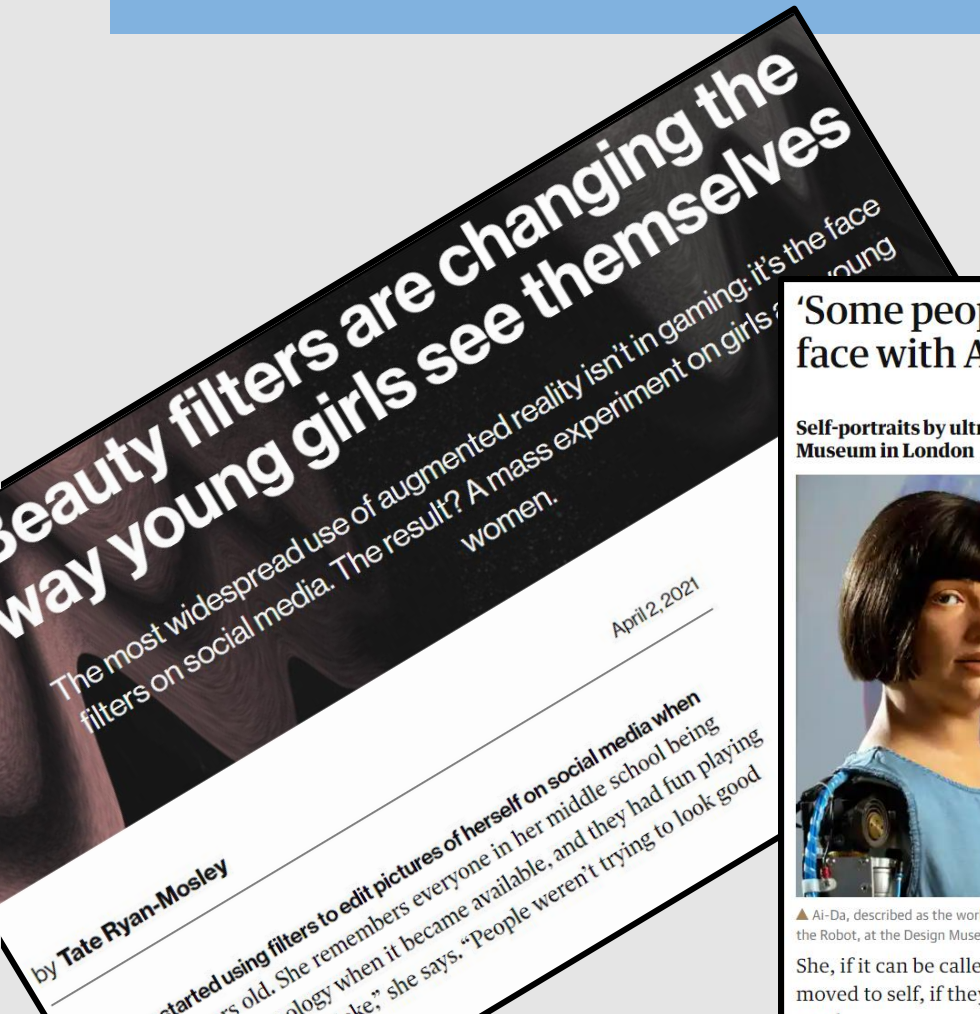
A new project using artificial intelligence technology could spell a medical breakthrough for people suffering from, or at risk of, coronary artery disease, the single leading cause of death in Australia.

The approach being developed by researchers at The University of Western Australia could allow for more accurate diagnosis and faster reporting across all aspects of healthcare, improving the quality and consistency of patient care.

The UWA team of experts in cardiac imaging and artificial intelligence was awarded $896,606 through a Medical Research Future Fund Frontiers grant to develop a tool to predict the risk of coronary heart disease from heart computed tomography (CT) scans.

Coronary artery disease resulting from the build-up of plaque affects more than 1.2 million Australians; however traditional methods using CT imaging of the heart are cumbersome, time-consuming and may have limited accuracy.

Advanced Technology in Society's "Sylicarbon Future"



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Advanced Technology in Society's "Sylicarbon Future"

The Interactive Biography of Stanley Bernath

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Advanced Technology in Society's Big Questions

How are these technologies shaping and reshaping our human experience?

How are technologies influencing the ways we interact?

What do we want technologies to do for us/humanity?

What do we want the future of life to look and feel like?

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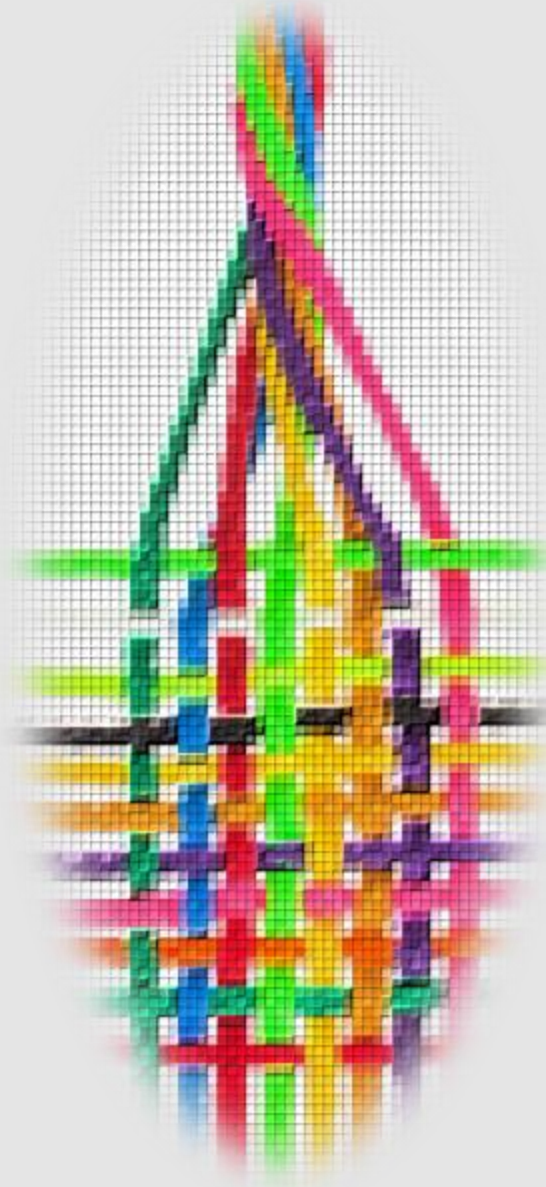
Advanced Technology in Society's Need for Transdisciplinarity

- It is impossible to answer these questions from one perspective, like engineering or business.
- Big questions require transdisciplinary approaches.
- TD allows us to tackle wicked social challenges and not get stuck in retrospective thinking/learning.
- Wicked problems do not have one clear answer, are intertwined with other social challenges.
- TD transcends boundaries that silo disciplines and divide university from community.
- TD allows for us to see problems in a new way, thus generate new knowledge/ideas for solutions.
- TD will also help us keep humanity at the core of the questions we ask and solutions we seek.



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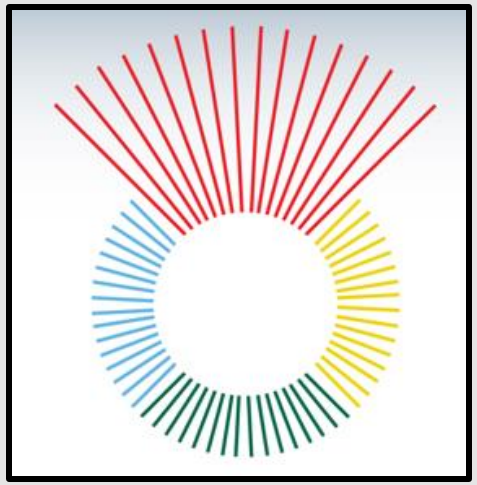
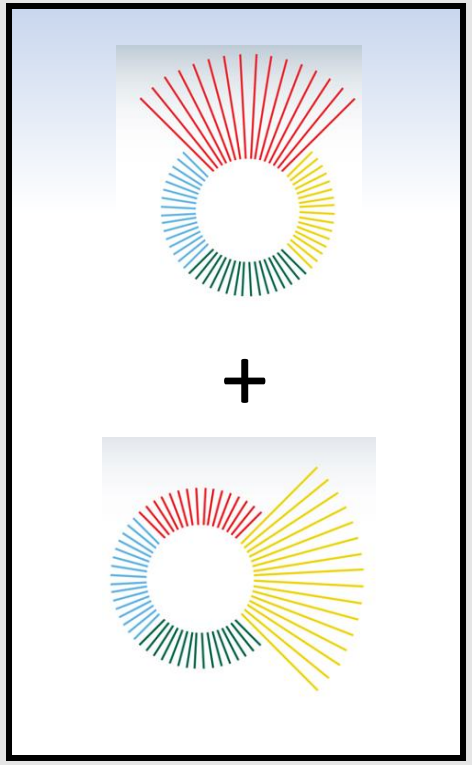
Transdisciplinarity

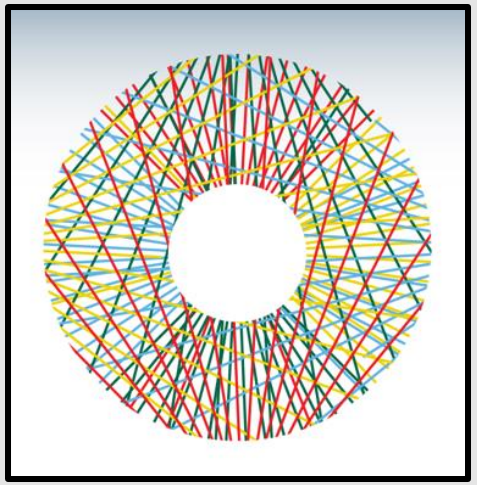
Monodisciplinary



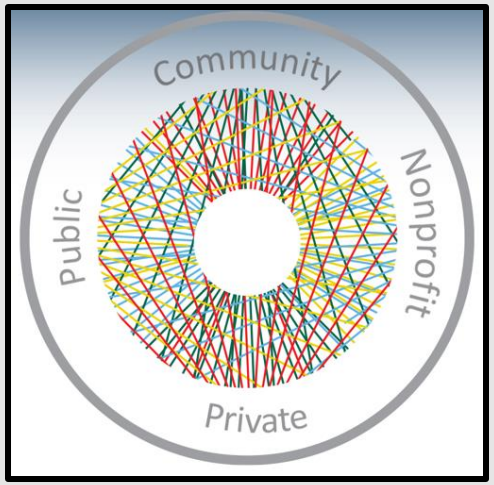
Multidisciplinary



Interdisciplinary



Transdisciplinary



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Case Study: the transfer of touch over distance via neuroreality™

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Case Study: a multi-university, transdisciplinary team

Case Western Reserve University

Biomedical Engineering
Electrical Engineering
Computer & Data Science

Cleveland State University

Urban Affairs, Public Administration
Transdisciplinary Studies

University of Wyoming

Politics, Public Affairs, Int'l Studies

Tuskegee University

Human-Centered Convergent Research

UCLA

Mechanical & Aerospace Engineering

University of Colorado Boulder

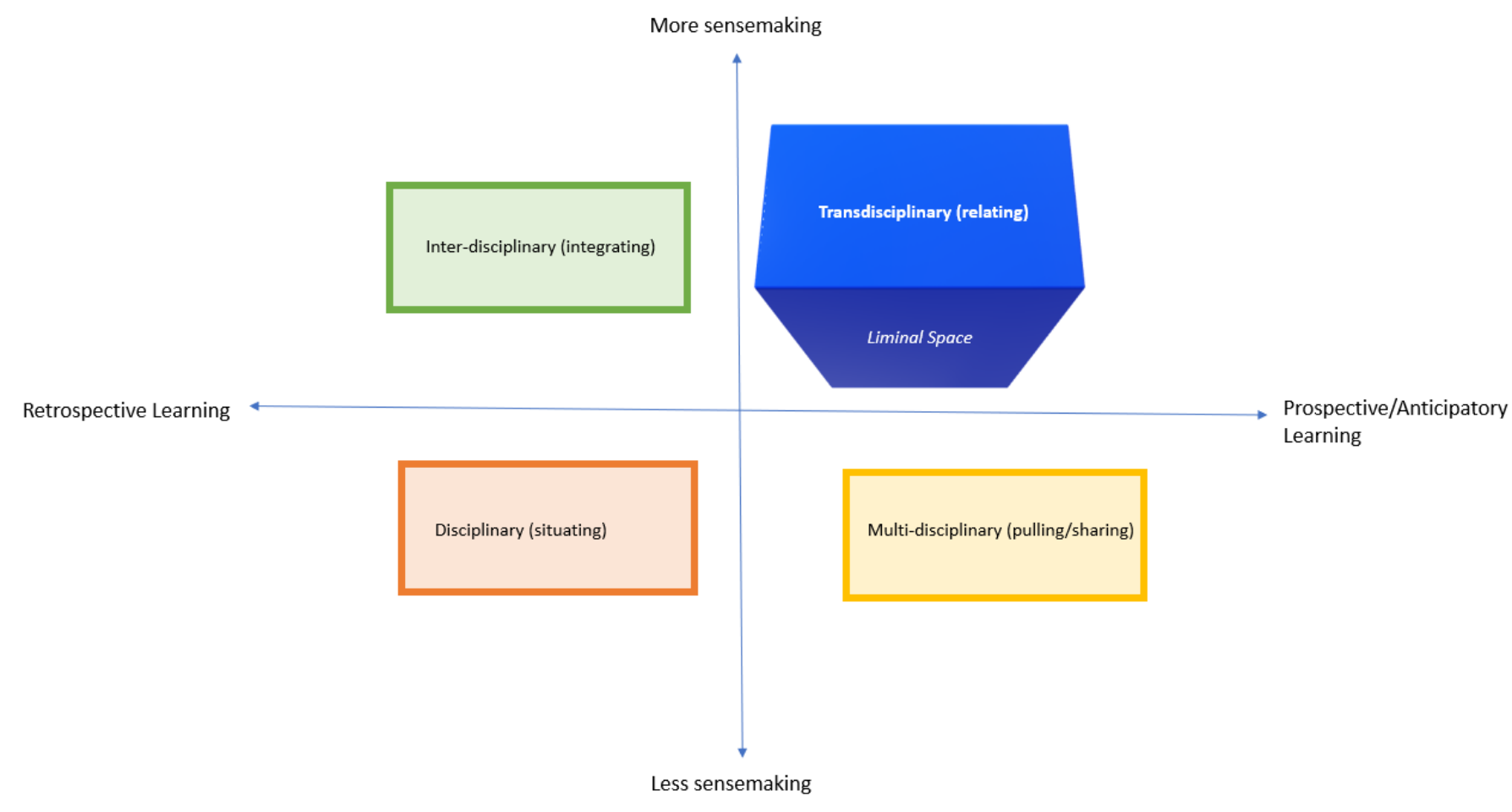
Mechanical Engineering

Carnegie Mellon University

Sensory & Cognitive Neuroscience

Transdisciplinarity

Towards Greater Sensemaking and Anticipatory Learning



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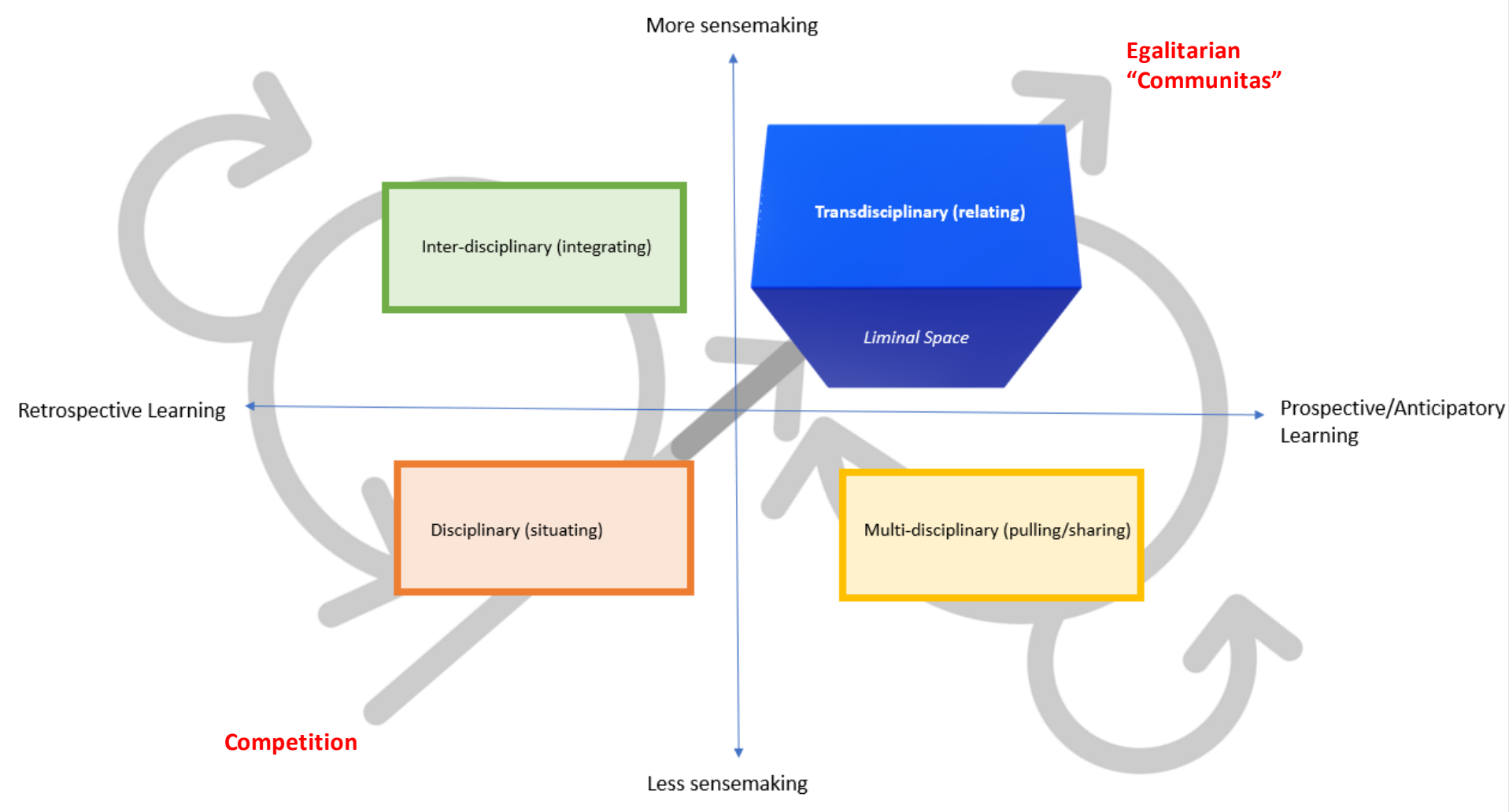
Transdisciplinarity

An Iterative Process: From Competition to Egalitarian



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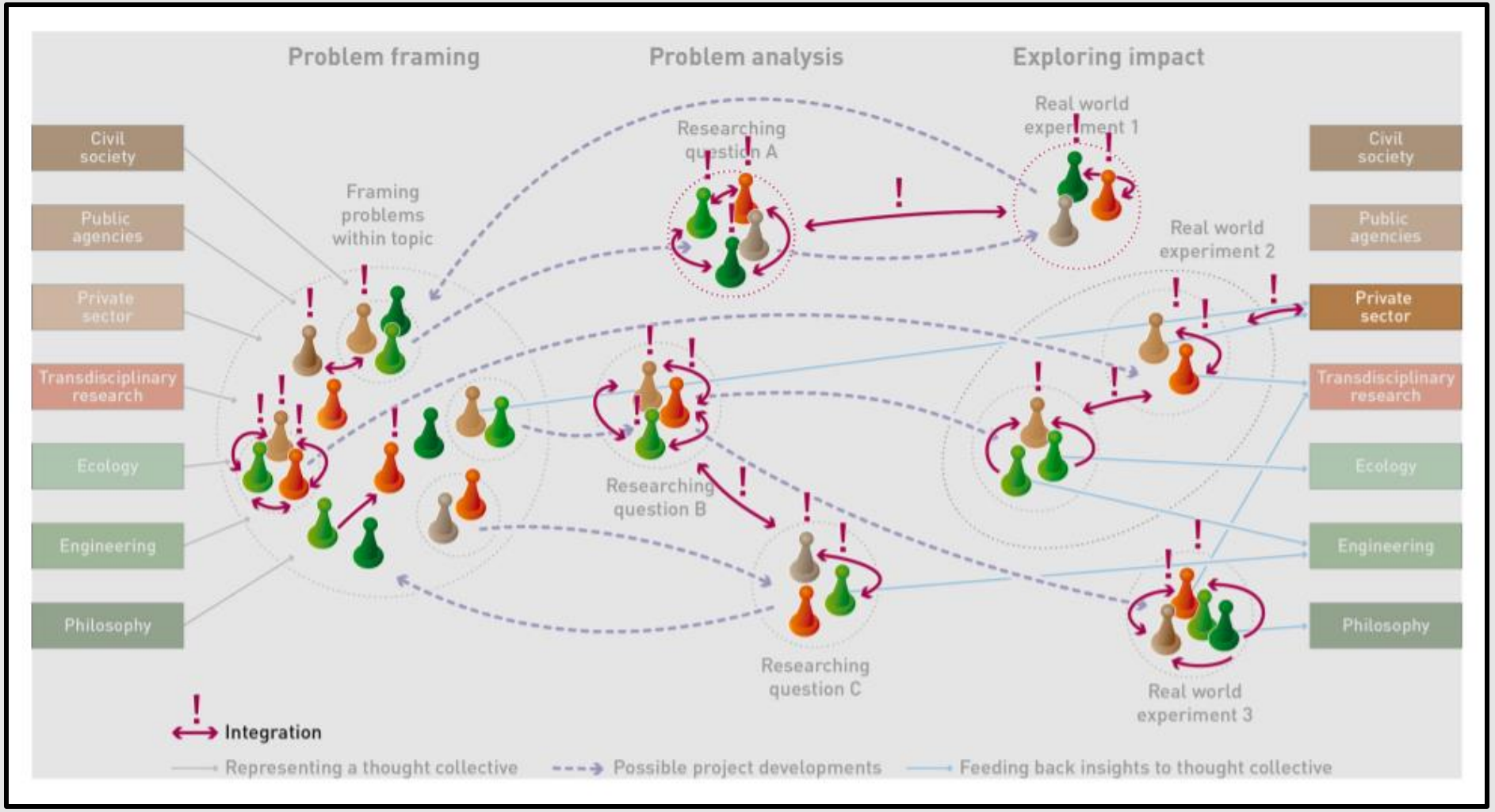
Transdisciplinarity



Model taken from Pohl et al. 2021

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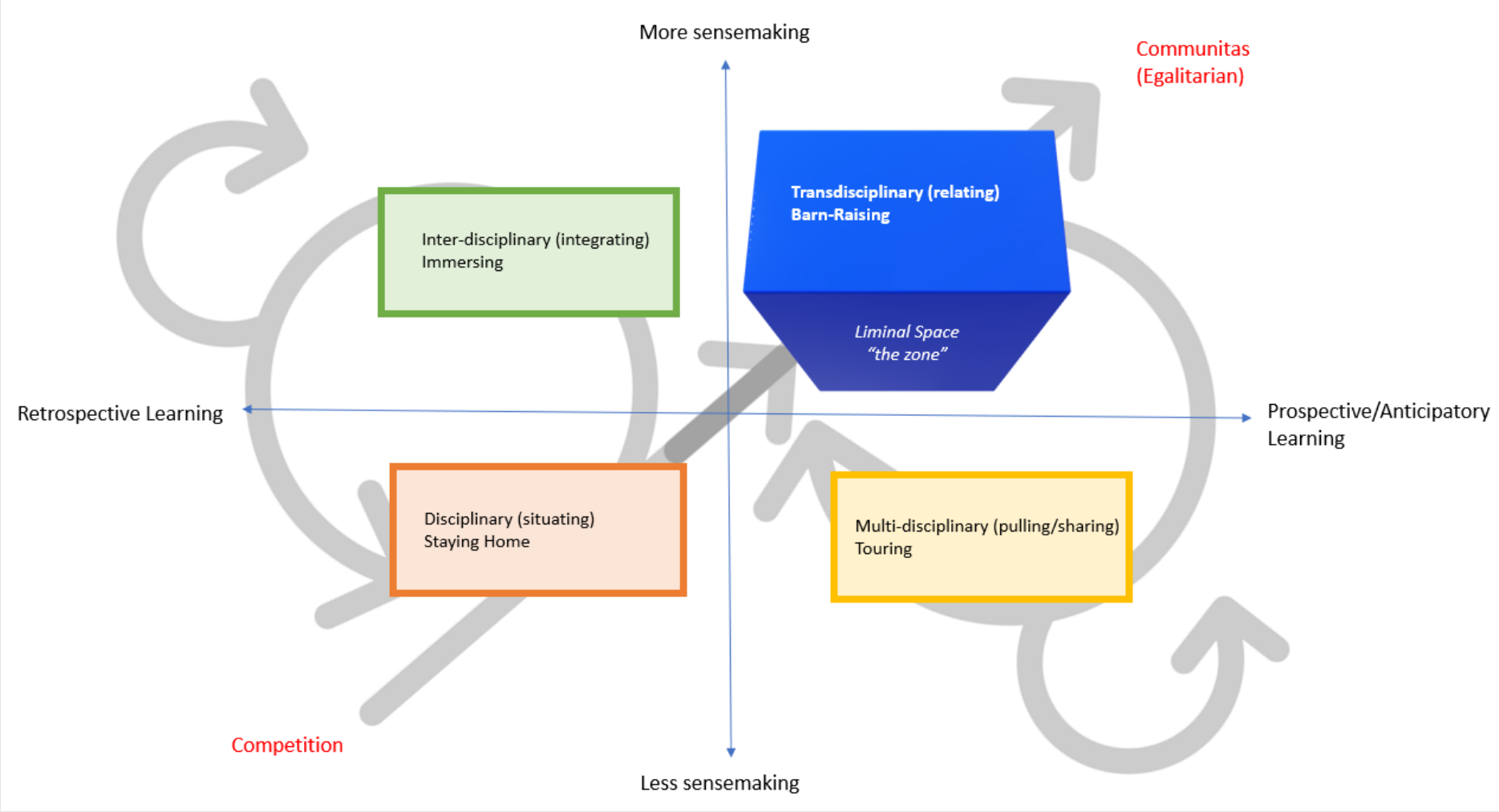
Transdisciplinarity

Interacting: From Staying Home to Barn-Raising



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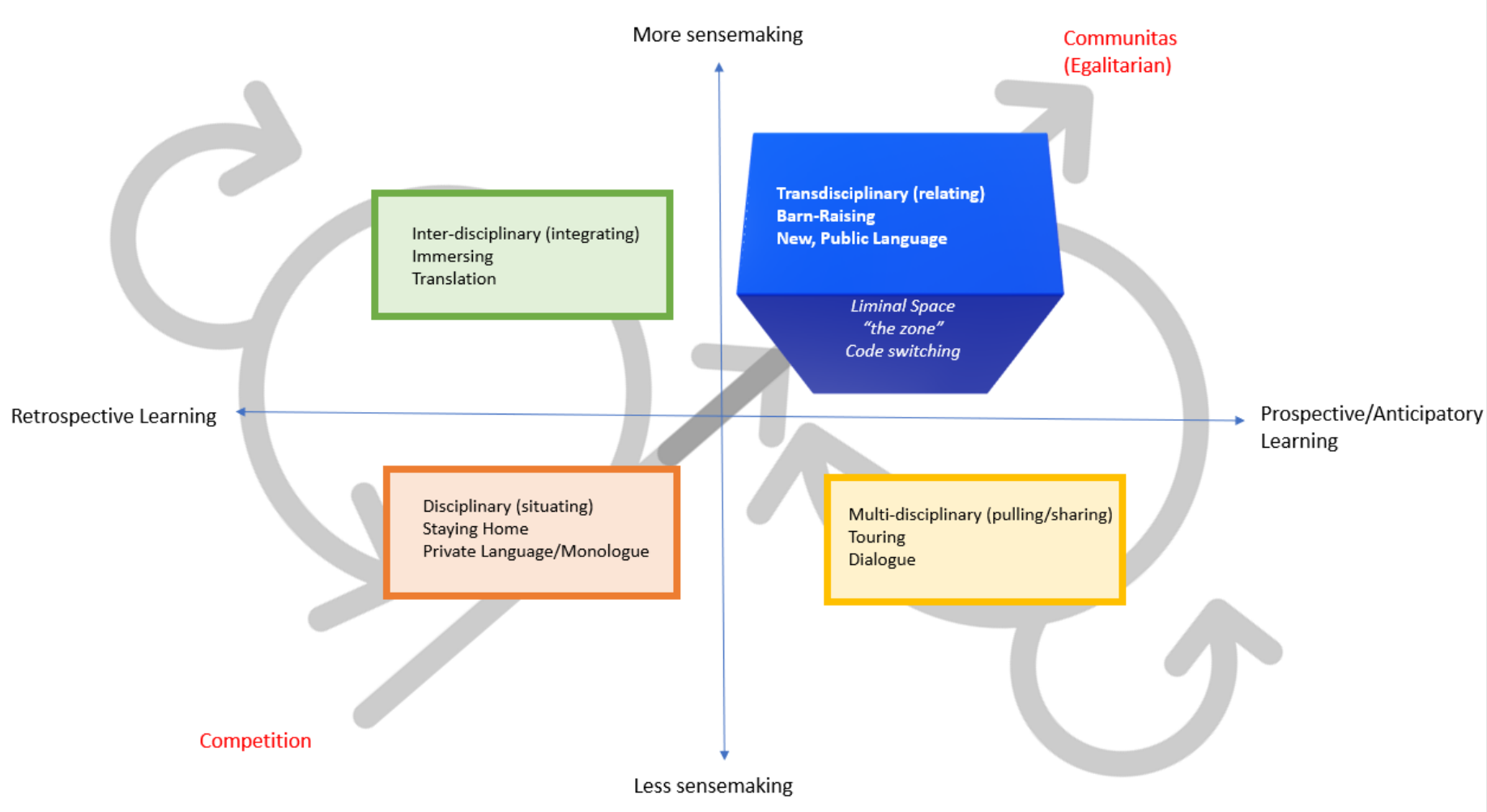
Transdisciplinarity

Language: from Private to Public



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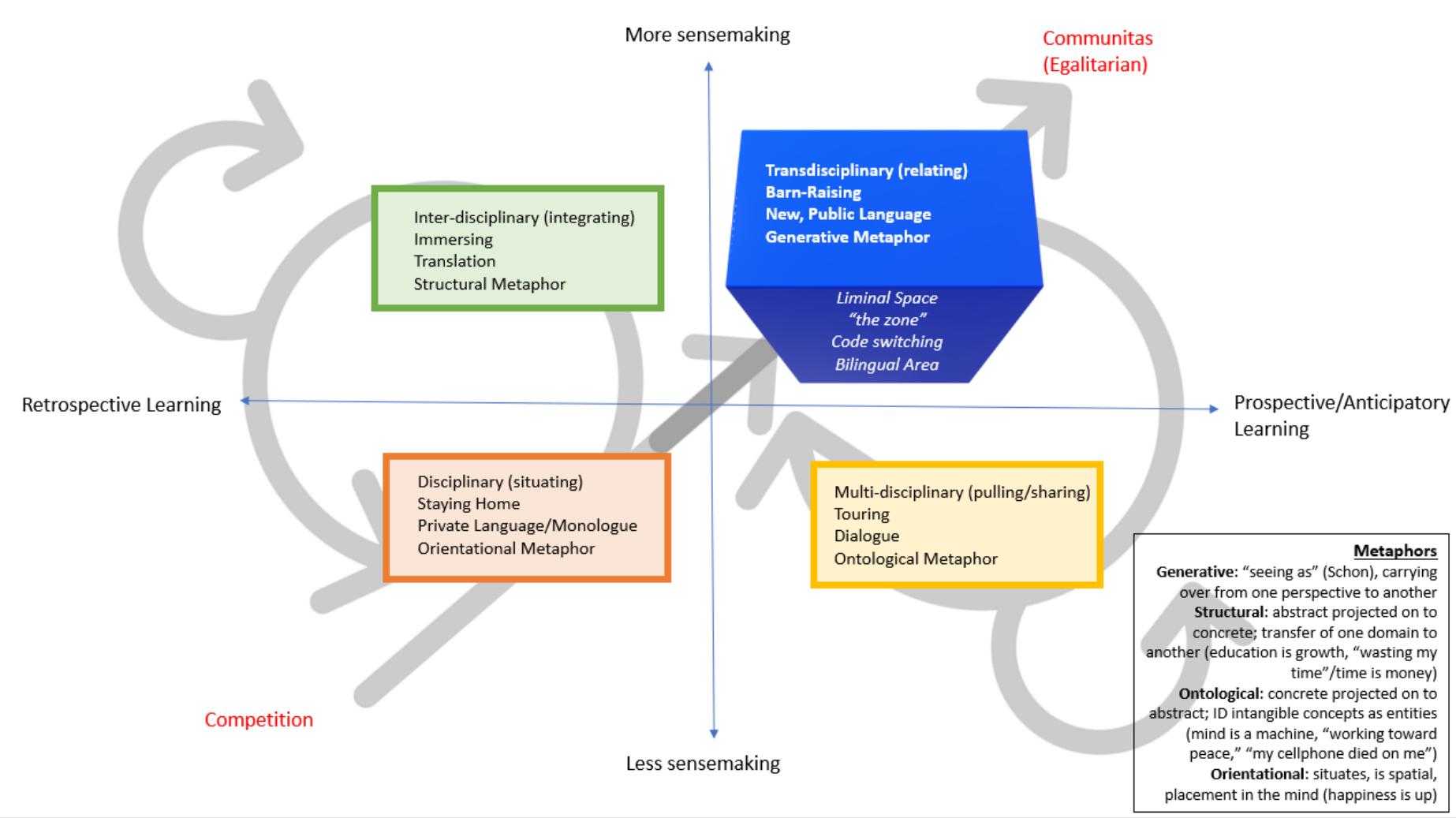
Transdisciplinarity

Boundary Objects: Generative Metaphors



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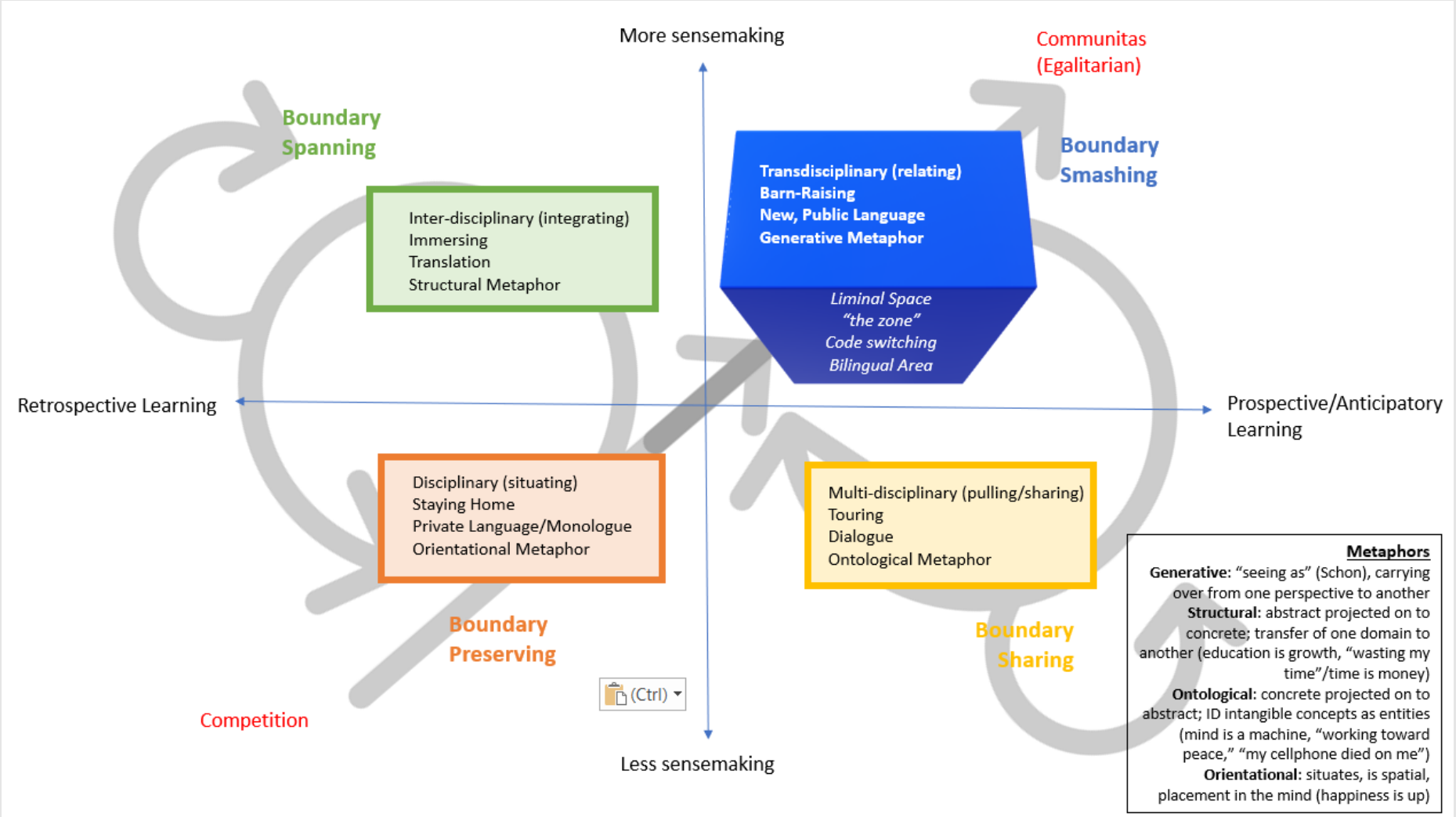
Boundaries: from Preserving to Smashing



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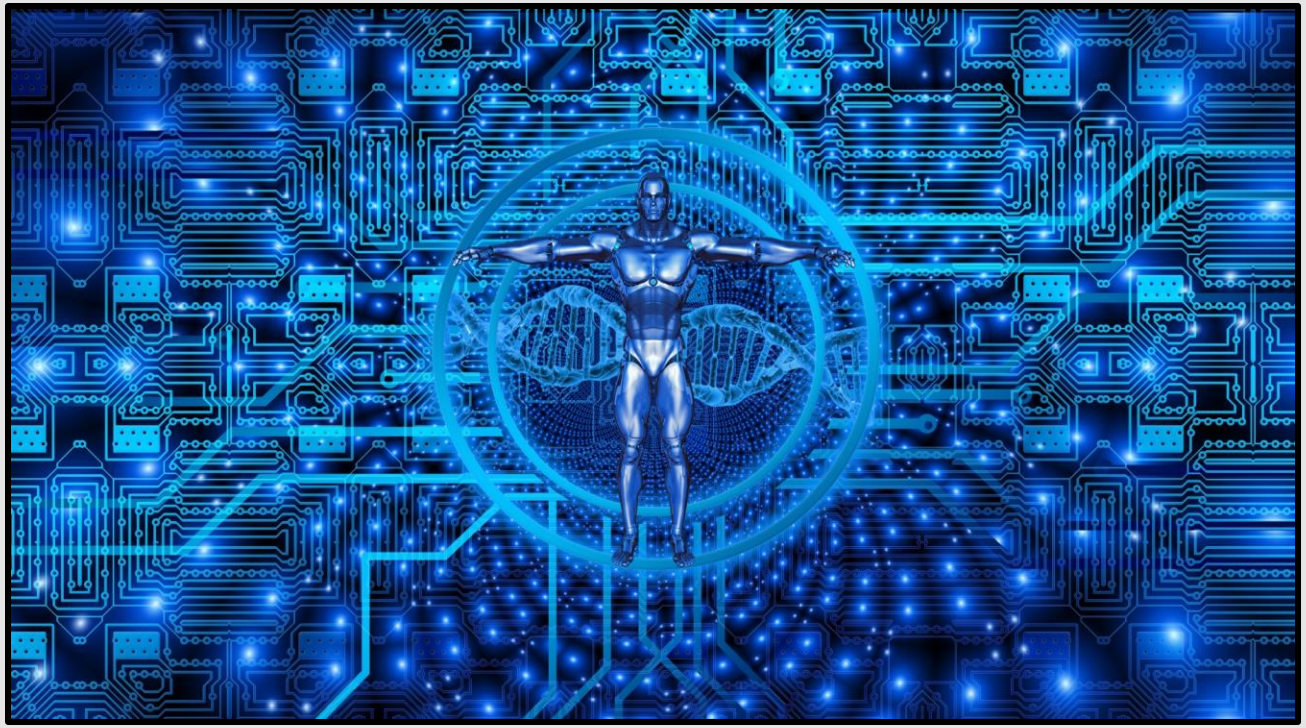
Transdisciplinarity and Advanced Technology in Society



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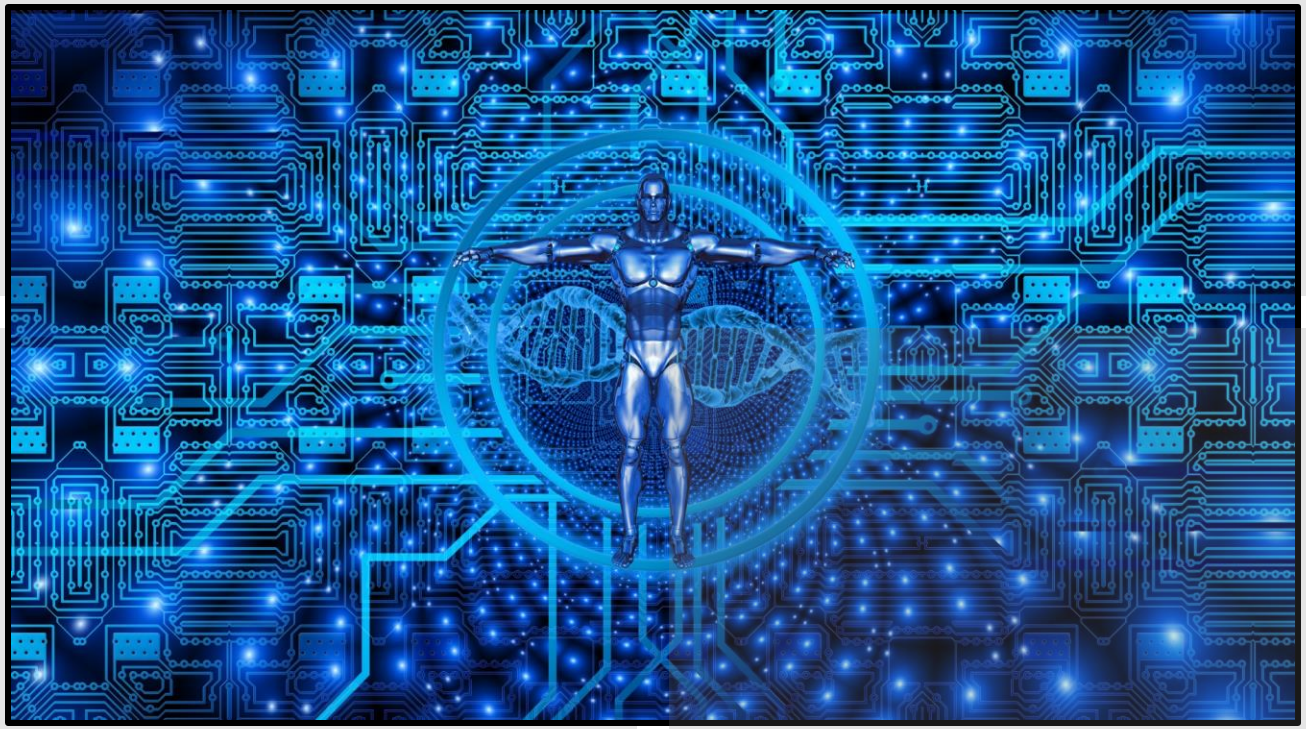
Questions and comments?

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