

# CCTST Grand Rounds

## Pursuing Transdisciplinary Research:

*What does it mean **and** How do I do it?*

Jack Kues, PhD

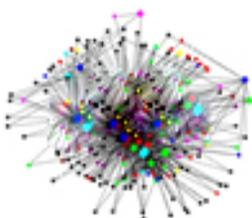
Director of The Center for Improvement Science

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MSB 2351



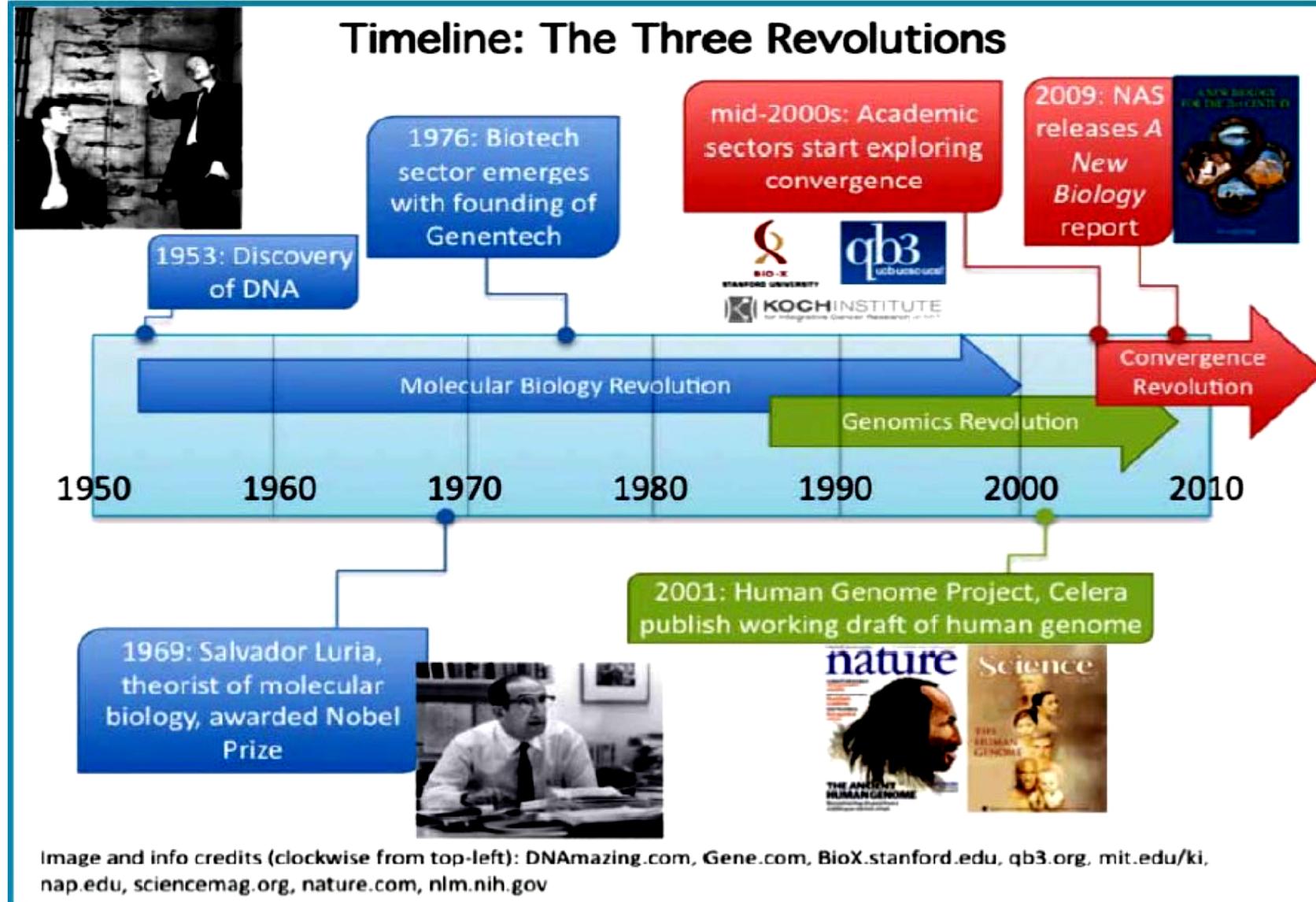
# Center for Improvement Science



- **Team Science Training:**
  - Workshops
  - Presentations
  - Workforce Development course
- **Consultations:**
  - Grants
  - Team Projects
  - Referrals to Resources such as the CCTST Integration Committee
- **The Collaboration Network (TCN):**
  - Virtual Meetings
  - Member Spotlights and Invited Speakers
  - Collaboration Building and Support

# A quick history lesson...





# Funding Initiatives to Promote Transdisciplinary Scientific Collaboration

- MacArthur Foundation Networks in Mental Health and Human Development (1980s)
- NCI TTURC, CECCR, TREK Programs (1999-)
- Robert Wood Johnson Foundation Active Living Program (2002-)
- NIH Roadmap Initiative (2003-)
- NAS/Keck Foundation Initiative to Transform Interdisciplinary Research (2003-)

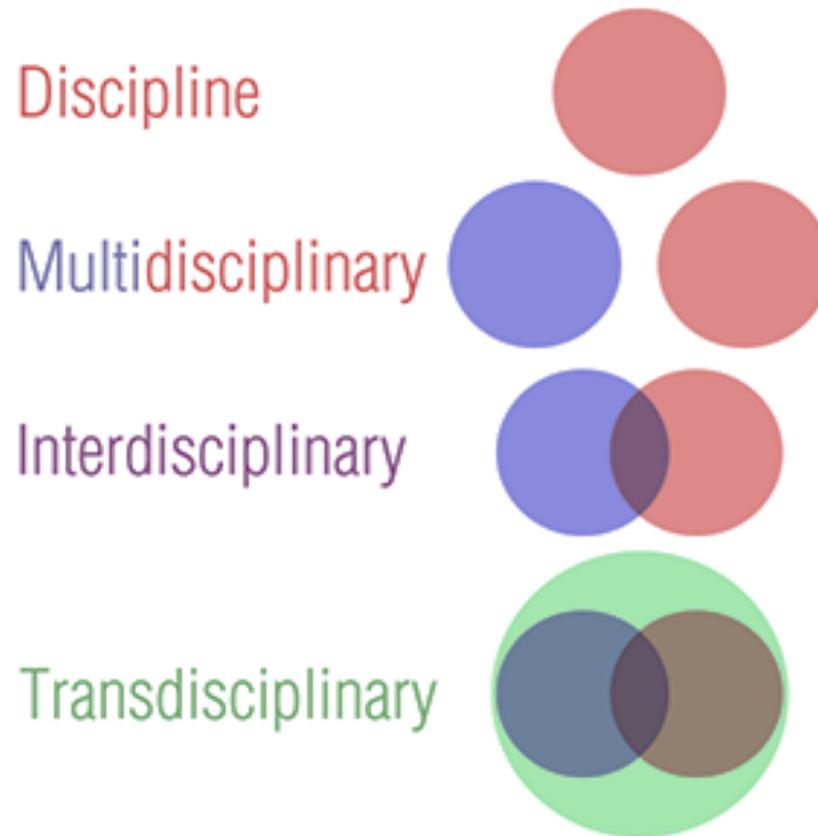
# Presumed Benefits of Transdisciplinary Scientific Collaboration

- Greater Explanatory Power
- Methodological Pluralism
- Broad-Gauged Public Policies
- Advantages of Generalist Training Programs

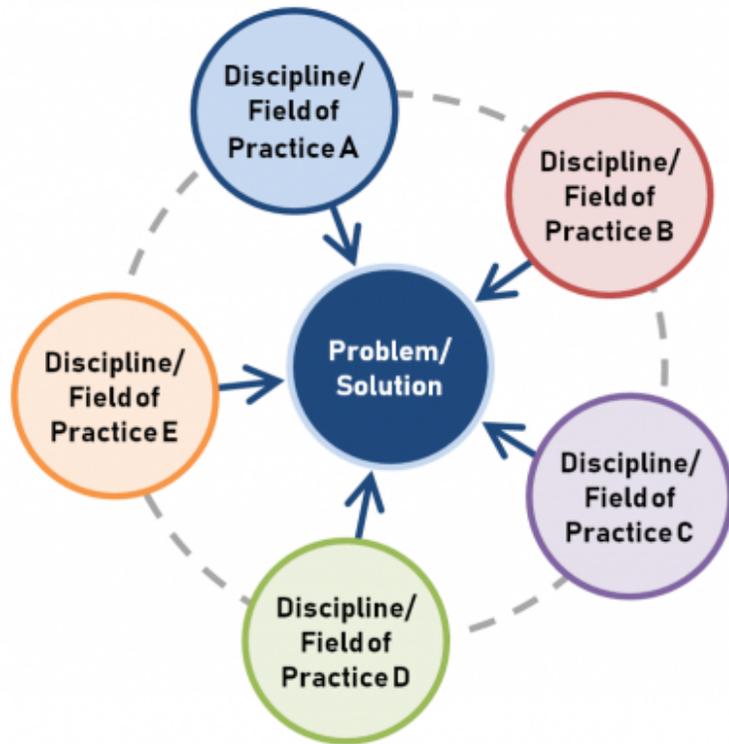
# Potential Costs of Transdisciplinary Scientific Collaboration

- Labor Intensive and Conflict Prone
- Administratively Complex
- Analytic Breadth vs. Depth Tradeoffs
- Diffuse vs. Focused Conceptual Models

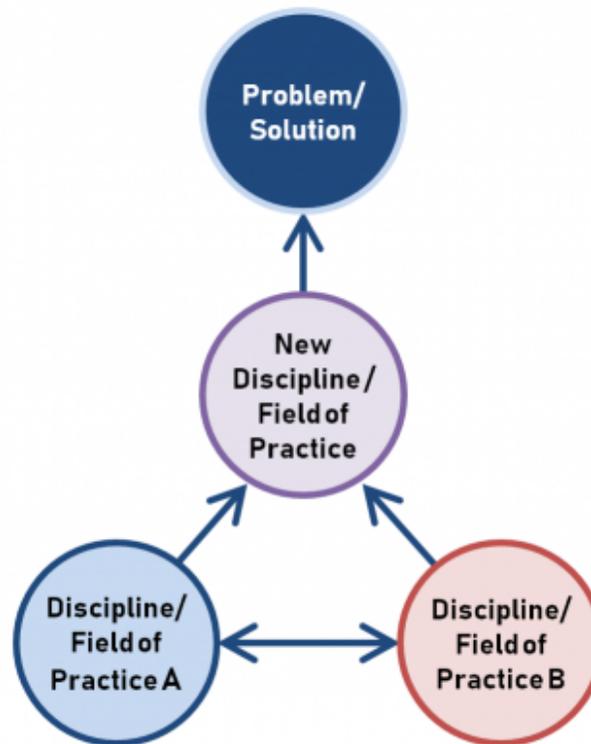
## Levels of Collaboration



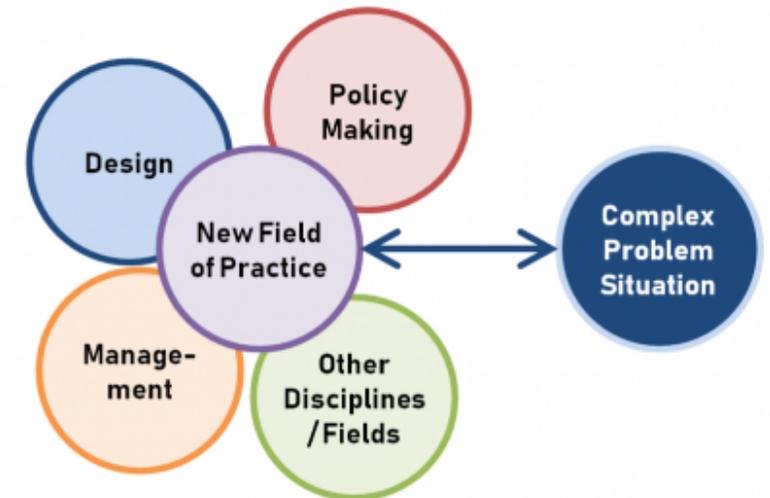
# Choosing Your Space



**Multidisciplinarity**



**Interdisciplinarity**



**Transdisciplinarity**

# Transdisciplinarity

1. Addresses complexity and fragmentation of knowledge
2. Non-linear and reflexive in approach to problems
3. Intercommunicative and intersubjective in process
4. Pragmatic and action-oriented

# Transdisciplinarity

The term “transdisciplinarity” was originally coined and developed within academia as a response to the fragmented organization of universities into faculties, schools, and degrees. More recently, transdisciplinarity is increasingly **relevant to innovators and entrepreneurs** whose technologies or solutions are **aimed at addressing *complex societal problems***. This larger-scale emphasis **moves innovation beyond “customer-centered” to a “*society-centered*” perspective**, and it requires active **collaboration with public and private sector organizations, governments, and communities.**

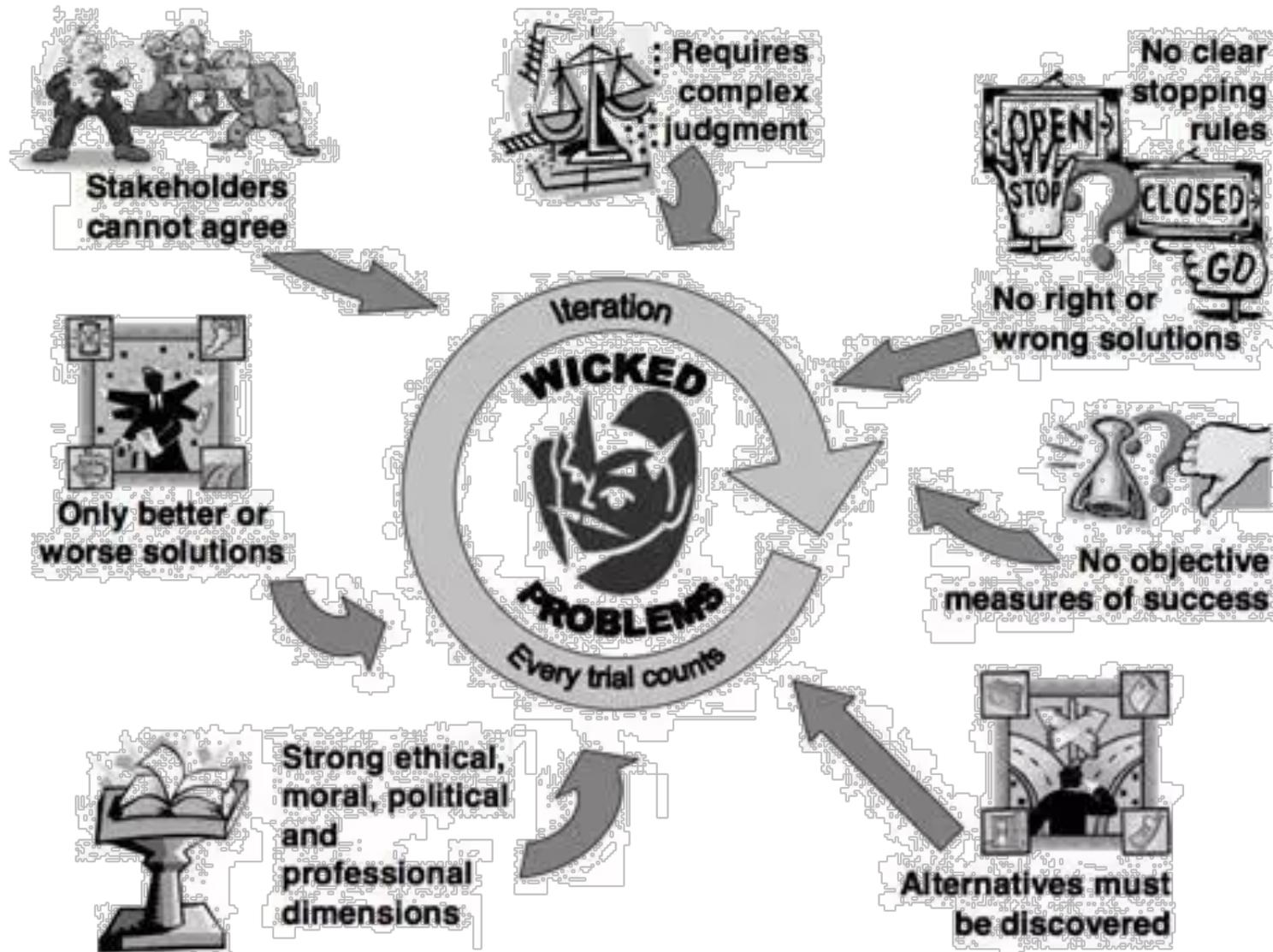


## Complex problems share a number of characteristics including:

1. The “solution” to the problem depends on how the problem is understood
2. The problem is not really understood until after it has been addressed
3. The problem cannot be completely solved
4. People involved can have very different world views and have radically different views about the causes of the problem and the best way to respond
5. Solutions to complex problems are not true or false, but good or bad, or better or worse
6. We cannot know beforehand what impact our interventions will have
7. Every complex problem is essentially unique
8. Cause and effect is unknown and unknowable
9. Every solution to a complex problem is a “one-shot operation,” and every attempt has unintended consequences
10. Every complex problem can be consider to be a symptom of another problem.

<b><i>A simple problem: Following a recipe</i></b>	<b><i>A complicated problem: Sending a rocket to the moon</i></b>	<b><i>A complex problem: Raising a Child</i></b>
The recipe is essential	Formulae are critical and necessary	Formulae have a limited application
Recipes are tested to assure easy replication	Sending one rocket increases assurance that the next will be OK	Raising one child provides experience but no assurance of success with the next
No particular expertise is required. But cooking expertise increases success rate	High levels of expertise in a variety of fields are necessary for success	Expertise can contribute but is neither necessary nor sufficient to assure success
Recipes produce standardized products	Rockets are similar in critical ways	Every child is unique and must be understood as an individual
The best recipes give good results every time	There is a high degree of certainty of outcome	Uncertainty of outcome remains





## Characteristics of a “Wicked Problem”

- Difficult to clearly define
- Many interdependencies and often multicausal
- Attempts to address the problem often lead to unforeseen consequences
- Frequently not stable
- Usually no clear solution
- Socially complex
- Rarely is the responsibility of only one stakeholder
- Solutions involve changing behaviors
- Can be characterized by chronic policy failure

# Examples of Wicked Problems

- A national healthcare system for the U.S.
- Sprawl and sustainable development
- What to do when oil resources run out
- The U.S. Social Security system
- World hunger
- Global warming
- Environmental planning

## *How do I do transdisciplinary research?*

Discipline



Multidisciplinary

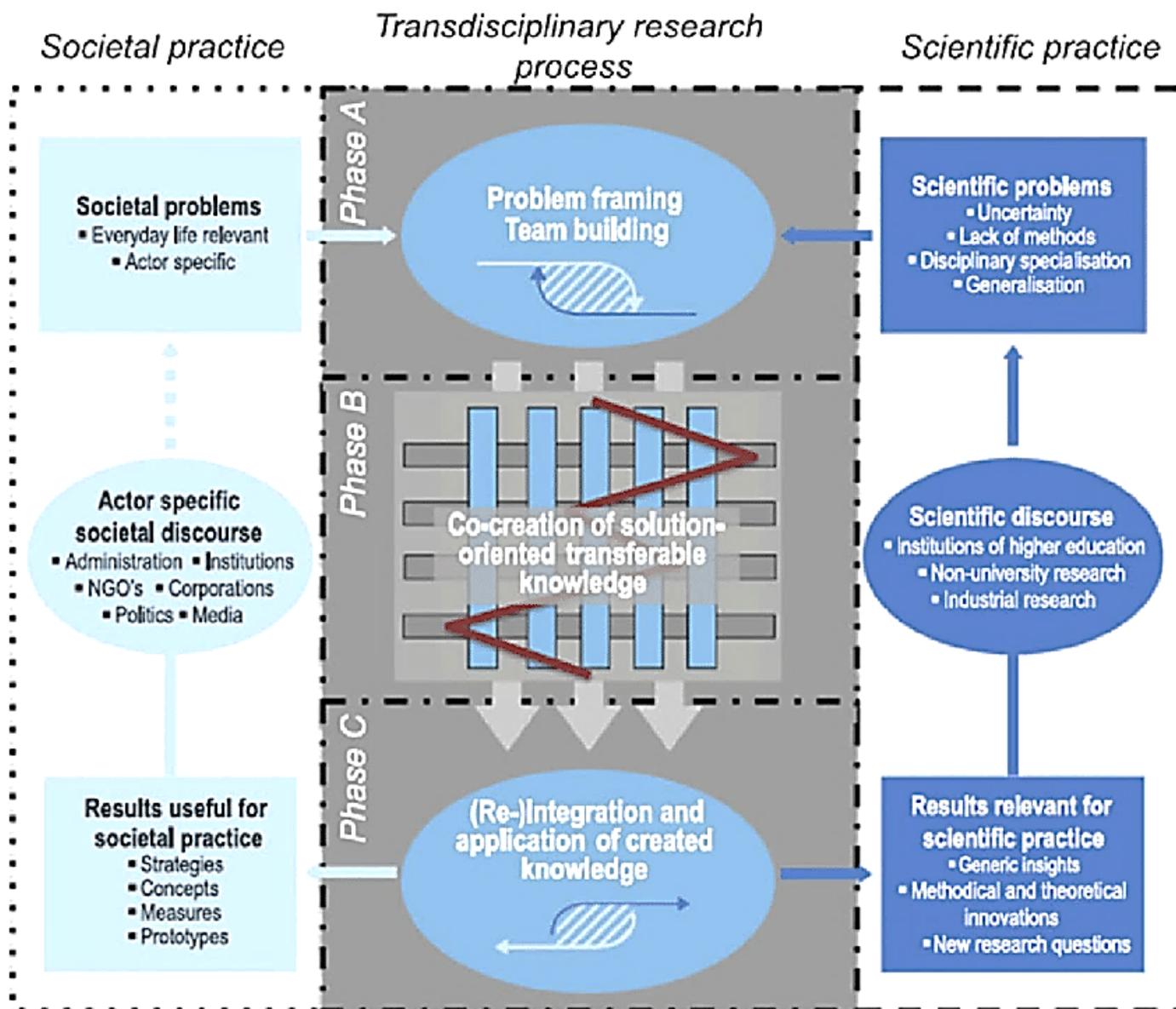


Interdisciplinary



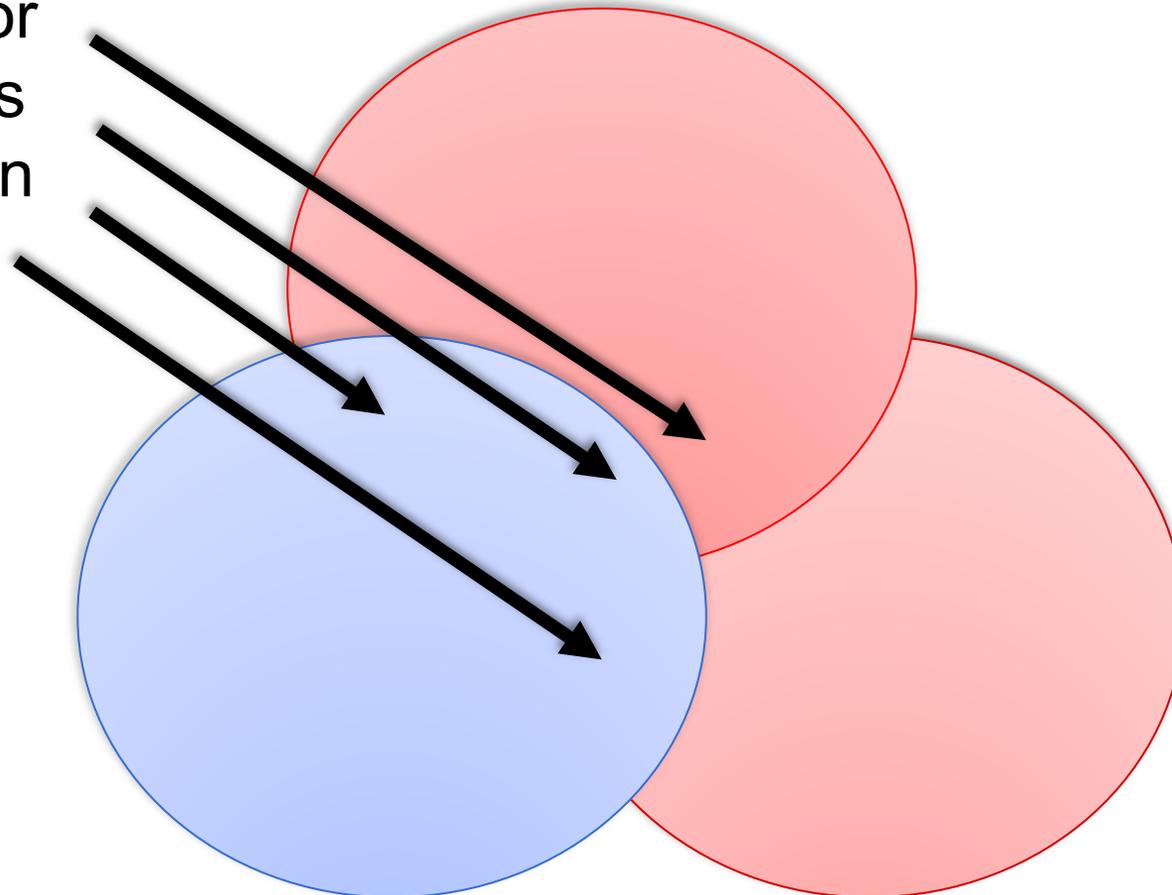
Transdisciplinary





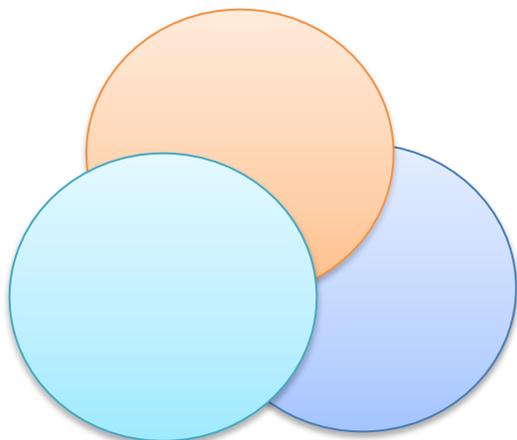
## Collaboration at the intersection of disciplines

Opportunity for  
New Thoughts  
and Innovation

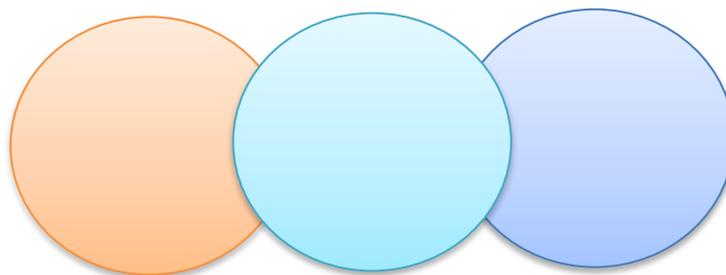


## Collaboration at the intersection of disciplines

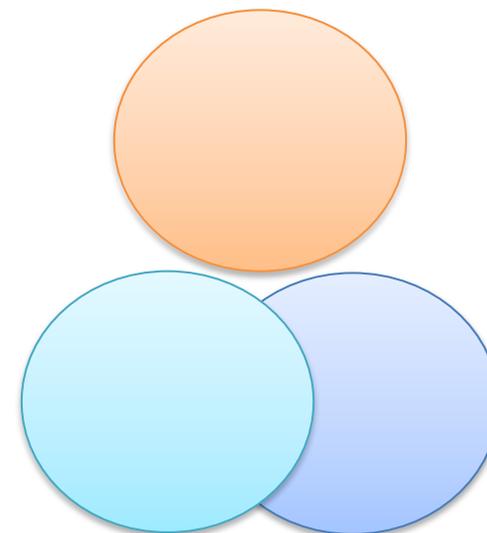
Fully Integrated



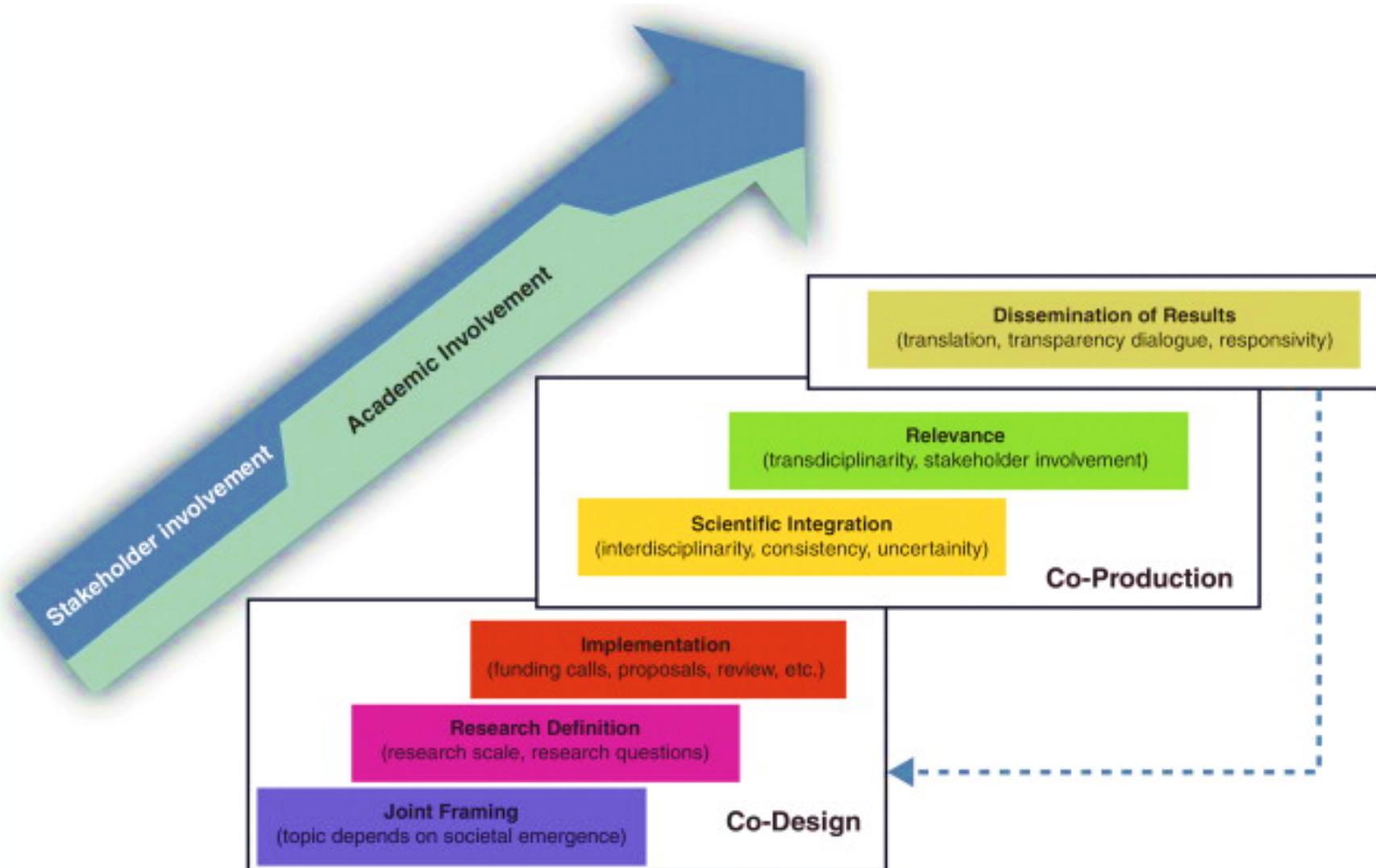
Sequentially  
Integrated



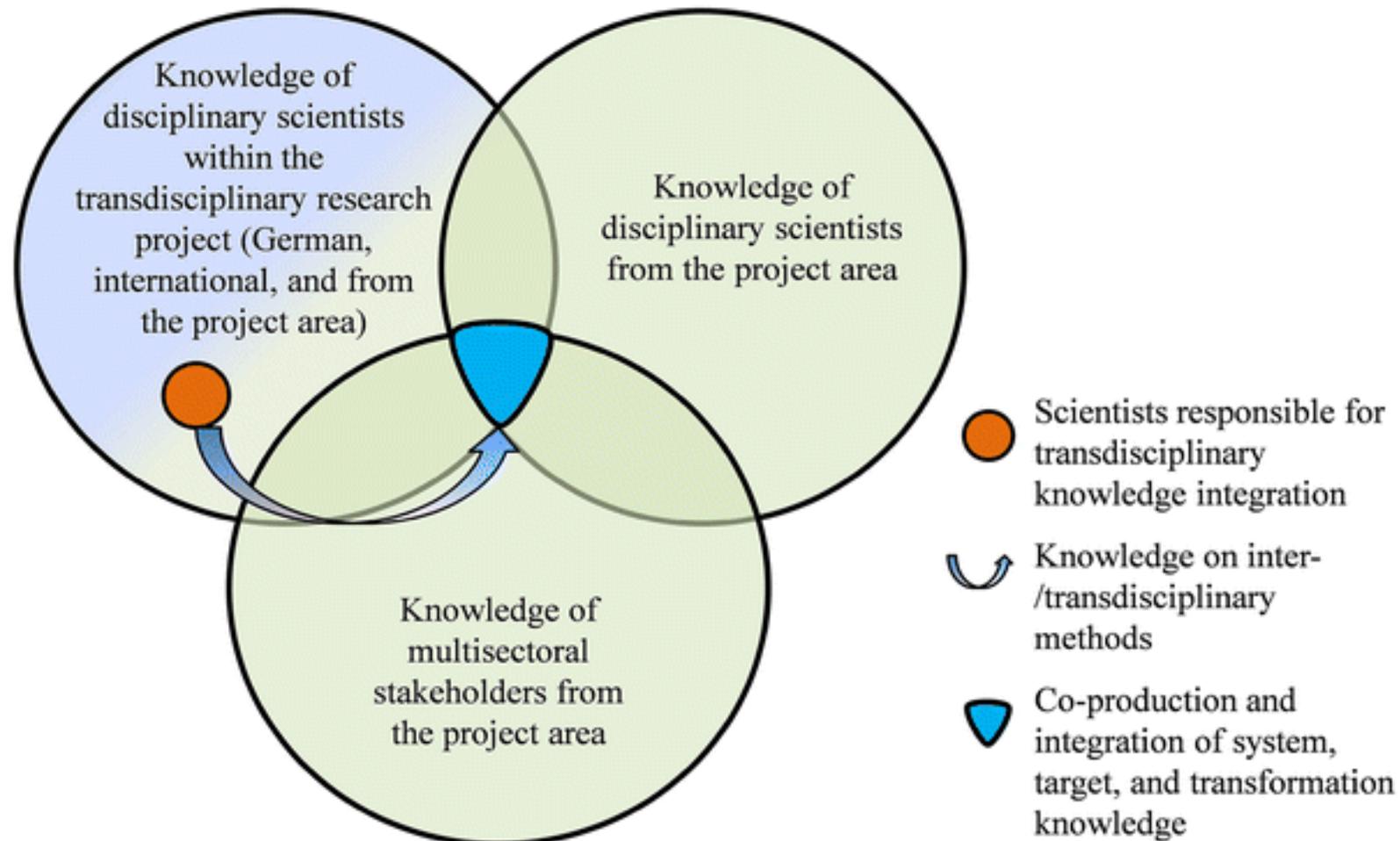
Partially Integrated



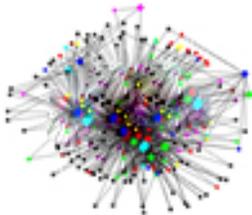
## Co-creation of knowledge



# A Call for Transdisciplinary Specialists



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# The Center for Improvement Science

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