



Societal Impact of Science

19-21 June, Halifax/Kjipuktuk

## Parallel Session (Ondaatje Hall)

# Challenges around and how to Support Interdisciplinary Research



# Societal Impact of Science

19-21 June, Halifax/Kjipuktuk

Irene Dal Poz (Chair)

Head of Impact Strategy, Oxentia Ltd,  
United Kingdom



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Kate Geddie

Senior Director, CIFAR, Canada

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# Interdisciplinary collaboration

Challenges + opportunities

**Kate Geddie, PhD**

Senior Director, Research

AESIS Conference, Halifax

June 21, 2023



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**CIFAR is a global research organization that convenes extraordinary minds to address the most important questions facing science and humanity.**

**By supporting long-term interdisciplinary collaboration, CIFAR provides researchers with an unparalleled environment of trust, transparency and knowledge sharing.**

**But what are the inherent challenges?**



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# Three interconnected pillars



Next  
generation  
initiatives



Research  
programs  
spanning the  
globe



Knowledge  
mobilization





Brain, Mind, & Consciousness



Bio-inspired Solar Energy



Boundaries, Membership & Belonging



Child & Brain Development



Earth 4D: Subsurface Science & Exploration



Fungal Kingdom: Threats & Opportunities



Future Flourishing



Gravity & the Extreme Universe



Humans & the Microbiome



Humanity's Urban Future



Innovation, Equity & the Future of Prosperity



Learning in Machines & Brains



The Multiscale Human



Quantum Information Science

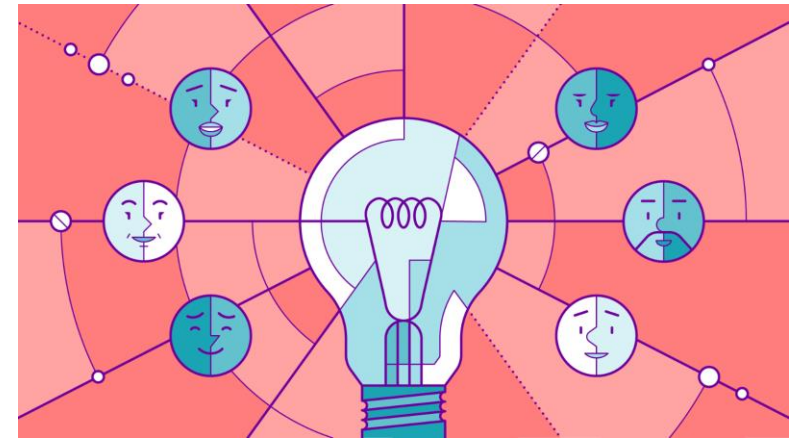


Quantum Materials

# CIFAR's research program model

Interdisciplinary, sustained networks focused on generating **transformative knowledge**

- + Comprised of 15-25 fellows from around the world (mix of career stages)
  - + 2 co-directors
  - + 4-6 Advisory Committee to steer and make recommendations to CIFAR
  - + 2-3 early career faculty
- + 2-3 meetings per year: deeply collaborative networks funded for 5-year terms (renewable), with a 10-year+ vision
- + Catalyst funds to encourage collaboration





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# Enabling conditions for successful collaboration

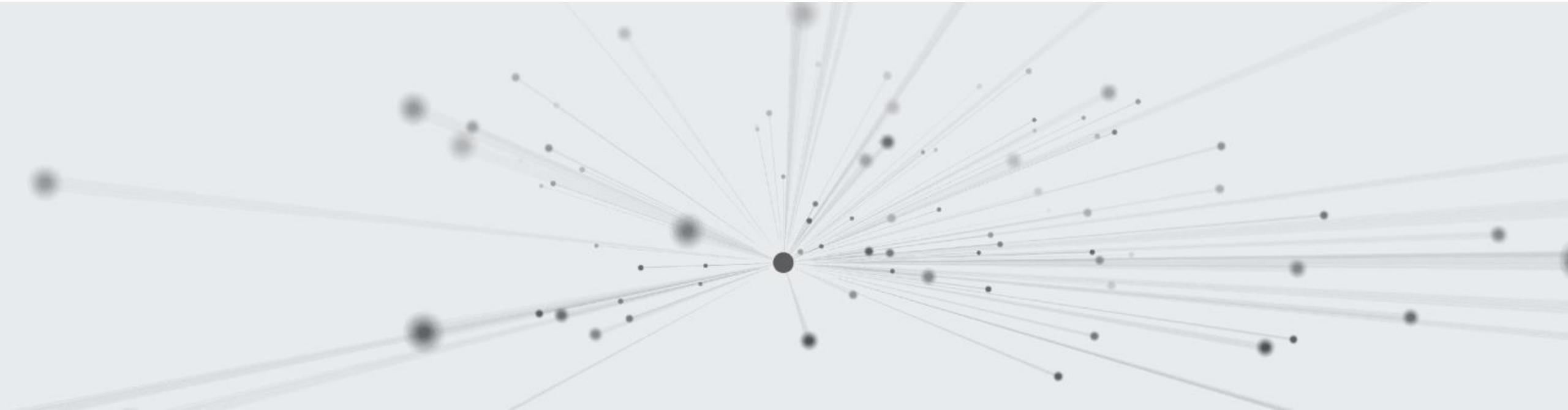
- Creating an optimal environment of trust and information-sharing
  - Commitment to long-term relationships
  - Individuals with deep expertise + an open spirit
  - Visionary and open leadership
  - Flat hierarchy
  - Flexibility
- + intentional practices



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# The multidimensionality of interdisciplinary collaborations

- Cognitive
- Emotional
- Interactional



(Lamont, Mansilla + Sato, 2016)



**Challenges:**

- 1. to successful collaboration**
- 2. to assessing impact**

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# Challenges for interdisciplinary collaboration?

1. Inability to establish mutual understanding, respect, and a common language
2. Inability to maintain positive/productive emotions
3. Group dynamics + power hierarchies disrupt the flow of information



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# How to assess successful collaborations?

Continual assessment of program health (short + medium-term outcomes):

- Meaningful individual benefit
- Active participation and diverse engagement in formal interactions (program meetings)
- New collaborations (publications; novel + strategic use of catalyst funds)
- Active engagement in knowledge mobilization initiatives
- Active engagement between meetings
- Sense of collective ownership + a shared agenda



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# How to assess impact?

1. Expert peer-review panels assess interdisciplinary scholarly impact on a global scale – evidence of **transformative knowledge** creation
2. **Case studies** to assess broad range of impact (longitudinal, mixed methods)

## Challenges:

- Long time horizon is essential: too long for many funders
- Wide range of characteristics of impactful research (policy change, economic impact, transferability): makes impact narrative challenging to tell
- **ATTRIBUTION** challenges!



# Different levels of knowledge outcomes

**Knowledge Outputs** – Knowledge outputs refer to all the collective outputs (defined in the PMS) for the three areas of CIFAR accountability.

**Knowledge Breakthroughs** – These are critical advances in the understanding of a research area and would reflect an outcome resulting from CIFAR's interdisciplinary teams. Such an outcome would largely be identified by the five-year peer-review process, PDARs and outcomes database.

**Transformative Knowledge** – This is a body of evidence or thinking that profoundly changes or creates a field of study of importance to our understanding of the world. This is expected to be a long-term outcome identified in a variety of ways including, the peer-review process, CIFAR external evaluations, PDARs, outcomes database, etc.

# CIFAR

## FUTURE FOCUSED

AI IS MORE LIKE A HUMAN BRAIN...

IN 1983, CIFAR TOOK A GAMBLE AND FUNDED RESEARCHERS TO COLLABORATE ON AI. WHEN THE WORLD HAD LOST INTEREST IN IT. LAYING THE FOUNDATION FOR MODERN DEEP LEARNING!

A.M. TURING AWARD

CANADA IS A WORLD LEADER IN A.I. AS A RESULT OF THIS EARLY INVESTMENT!

BRINGING CANADA to the WORLD...



REVOLUTIONARY THINKING!! SEARCHING for SCIENTIFIC BREAKTHROUGHS!

HIGH-RISK

HIGH REWARD IDEAS

IDEAS THAT CAN TRANSFORM CANADA'S ECONOMY!

NEW KNOWLEDGE for a BETTER WORLD

PROVIDE YOUNG TALENT ACCESS to BIG BRAINS

COLLABORATION to ADDRESS COMPLEX and URGENT CHALLENGES

20-30 YEARS in the FUTURE

WHAT'S the NEXT BIG IDEA?

TRAINING PROGRAMS PIPELINE of FUTURE TALENT. an INVESTMENT in OUR YOUTH!

FUTURE NOBEL LAUREATE!



BIGGEST BRAINS at the TABLE!

INTERNATIONAL, MULTI-DISCIPLINARY DREAM TEAM! EQUITY DIVERSITY INCLUSION

SUPPORTING the DEVELOPMENT of FUTURE RESEARCH LEADERS

DRIVING SOCIETAL IMPACT THROUGH KNOWLEDGE MOBILIZATION

ADVANCING SCIENTIFIC KNOWLEDGE IN HIGH-RISK, COMPLEX AREAS of ENQUIRY

**CIFAR** **40** YEARS  
**ANS**





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# Challenges around (and how to support) Interdisciplinary Research

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Interdisciplinary  
leadership

Research Evaluation, 2023, 00, 1-8  
<https://doi.org/10.1093/rev/evd011>  
Special Issue Paper

**RE** sponsible  
**imp**ACT OXFORD

### The missing links of research impact

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**Abstract**  
In this article, we present a conceptual framework for studying research impact focusing on the foundations that need to be in place to accelerate an observable change of policy, practice or behaviour. The article investigates the relationship between micro-impacts and societal change, and how smaller impacts scale into larger cascades of end effects and value creation. We define micro-impacts as interactions and connections where information is exchanged between a researcher or research group and external audiences, stakeholders or co-producers. Micro-impacts are elements in highly complex causal relations between research activities and larger societal macro-impacts. We argue that even though these causal relations are complex, micro-impacts are tangible and observable and should be integrated in research evaluations as constitutive elements of causal impact relations leading to larger macro-impacts. We suggest a working model for studying micro-impacts and for reflecting on the causality of impacts by drawing on contributions from philosophy of causation. A proper understanding of causation is a prerequisite for eventually understanding and capturing research impact, which itself is a prerequisite for responsible research assessment and planning.

**Keywords:** impact assessment; impact pathways; causation; contribution analysis

New Directions in the Philosophy of Science

THE STRUCTURE OF  
INTERDISCIPLINARY SCIENCE

Rolf Hvidtfeldt

# The missing links of research impact

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In this article, we present a conceptual framework for studying research impact focusing on the foundations that need to be in place to accelerate an observable change of policy, practice or behaviour. The article investigates the relationship between micro-impacts and societal change, and how smaller impacts scale into larger cascades of end effects and value creation. We define micro-impacts as interactions and connections where information is exchanged between a researcher or research group and external audiences, stakeholders or co-producers. Micro-impacts are elements in highly complex causal relations between research activities and larger societal macroshifts. We argue that even though these causal relations are complex, micro-impacts are tangible and observable and should be integrated in research evaluations as constitutive elements of causal impact relations leading to larger macroshifts. We suggest a working model for studying micro-impacts and for reflecting on the causality of impacts by drawing on contributions from philosophy of causation. A proper understanding of causation is a prerequisite for eventually understanding and capturing research impact, which itself is a prerequisite for responsible research assessment and planning.

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Conceptual framework for studying the foundations that need to be in place in order to generate (macro-)impact.

Micro-impacts are elements in the highly complex causal relations between research activities and societal changes.

A proper understanding of causation is a prerequisite for understanding and capturing research impact

A SHORT STORY  
OF (micro-)IMPACT

Suppose that the parliament of a given country at some point agrees on a change of law. When impact evaluators examine the process that led to the decision to change the law, they observe that a certain expert testimony convinced members of a political party to change their position, which eventually tipped the democratic balance in favour of making a legal change.

What is the exact force of the statement that this expert testimony caused the change of law? Clearly the impact evaluators are not saying that the expert testimony was a necessary condition for the legal change; they know well that a testimony from a different expert, or any number of other advisors, might, if they had occurred, have had similar effects on the convictions of the members of the party.

The impact evaluators are also not saying that the testimony was a sufficient condition for the change of law; for if the expert testimony had occurred, but there had been no politicians with the capacity to grasp the implications of the legal argument, the change of position would not have happened. Even given the testimony and the cognitive capacity of policymakers, the change of position might not have occurred if, say, there had been an efficient counterargument by some other convincing expert.

Far from being a necessary and sufficient condition for the change of law, the expert testimony was, and is known to the impact evaluators to have been, neither necessary nor sufficient. In what sense, then, can the legal expert be said to have caused the legal change?



At least part of the answer is that there is a set of conditions (of which some are positive and some are negative), including the presence of absorptive capacity, the absence of an efficient counter-argument, and no doubt a number of other factors, which, combined with the expert testimony, constituted a complex set of conditions that were collectively sufficient for the change of policy and subsequent change of law but not necessary since the legal change could have been caused in other ways.

**Micro-impact** = an

Insufficient but

**N**on-redundant part of an

**U**nnecessary but

**S**ufficient

condition for some effect to occur.

**THERE IS NO SUCH  
THING AS SIMPLE,  
MONO-CAUSAL,  
INSTANT  
IMPACT**

Mackie JL (1965): "Causes and Conditions", *American Philosophical Quarterly*, 2(4), 245-264.

— (1974): *The Cement of the Universe*, Oxford: Oxford University Press.

# Structuring & triggering micro-impacts

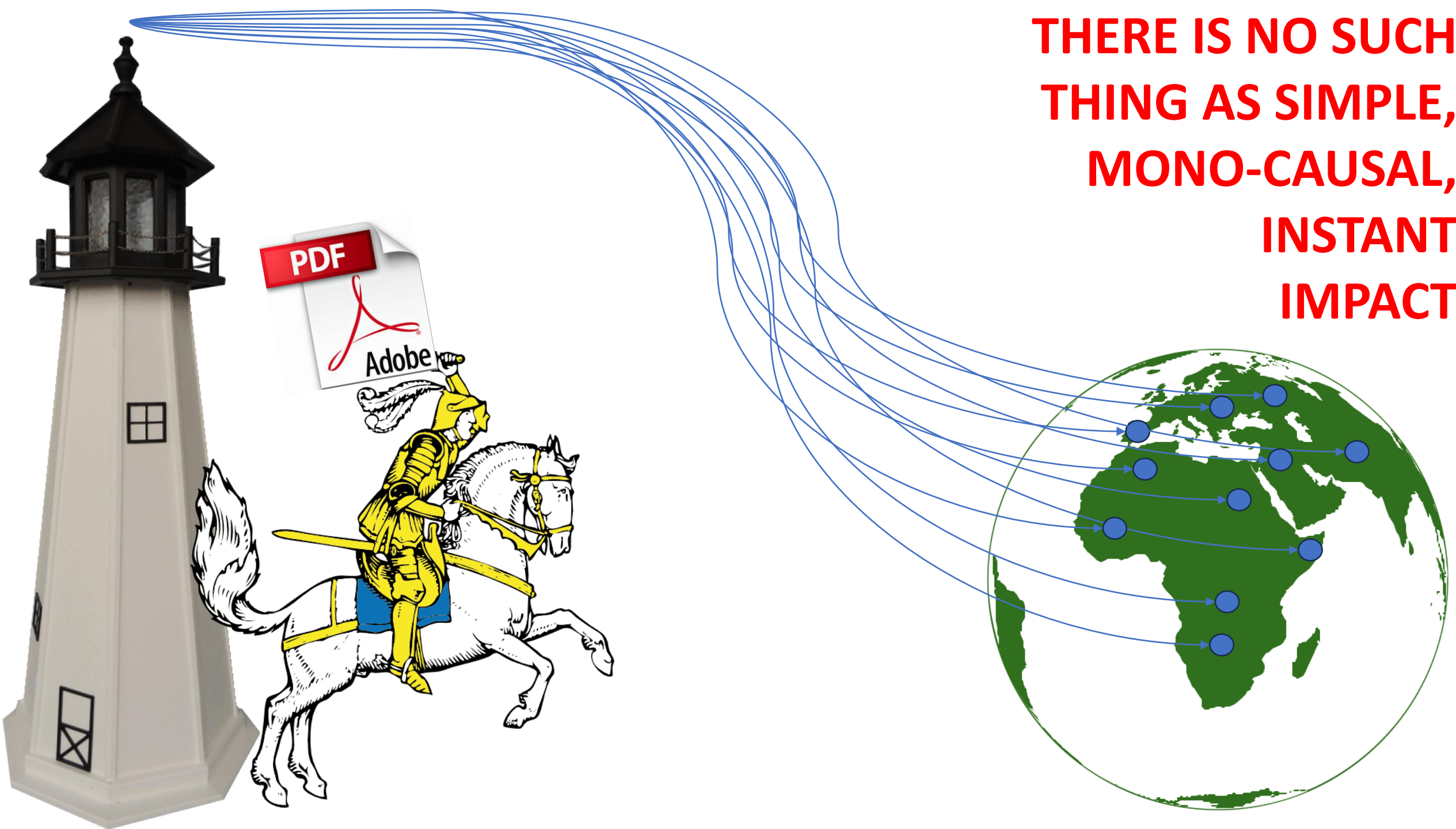
**Triggering micro-impacts** (e.g. an expert testimony) are causes that elicit some observable effect based on already established conditions.

**Structuring micro-impacts** are causes that establish conditions that make it possible to trigger some effect.

# Structuring & triggering micro-impacts

The complete set of causes for societal impact are composed of a large number of temporally and geographically distributed *structuring* micro-impacts together with a few, conspicuous *triggering* micro-impacts.

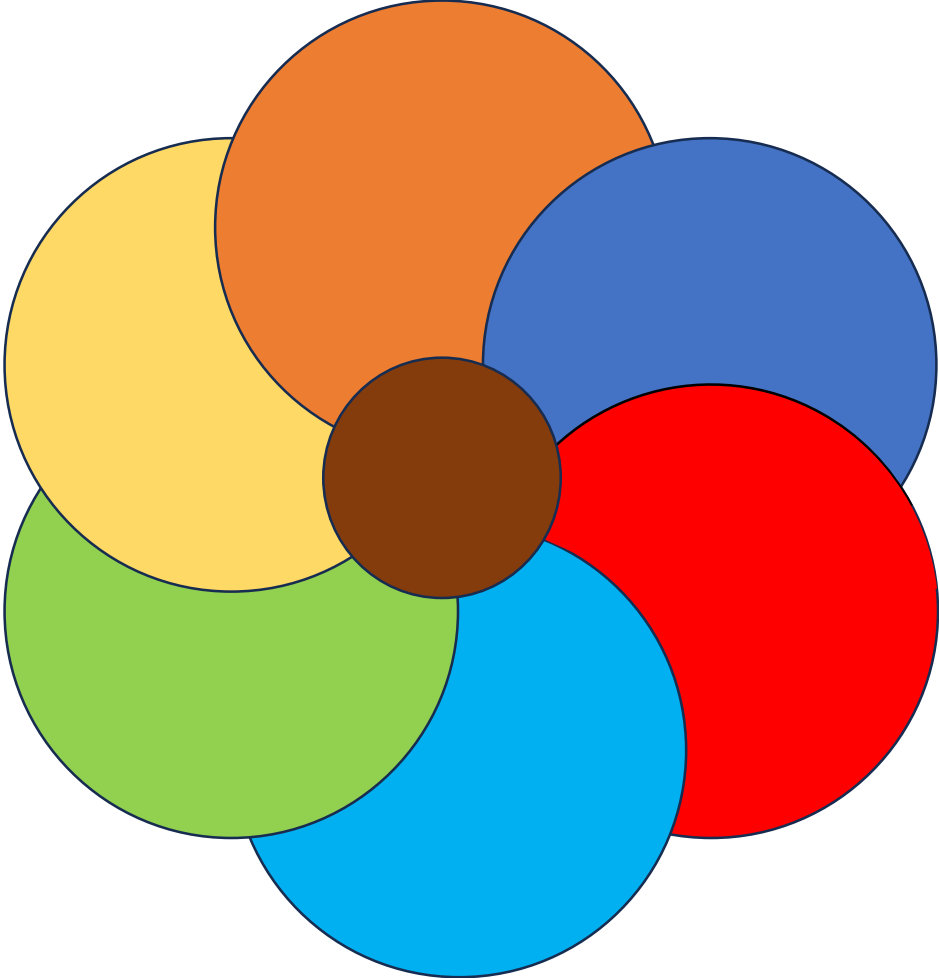
**THERE IS NO SUCH  
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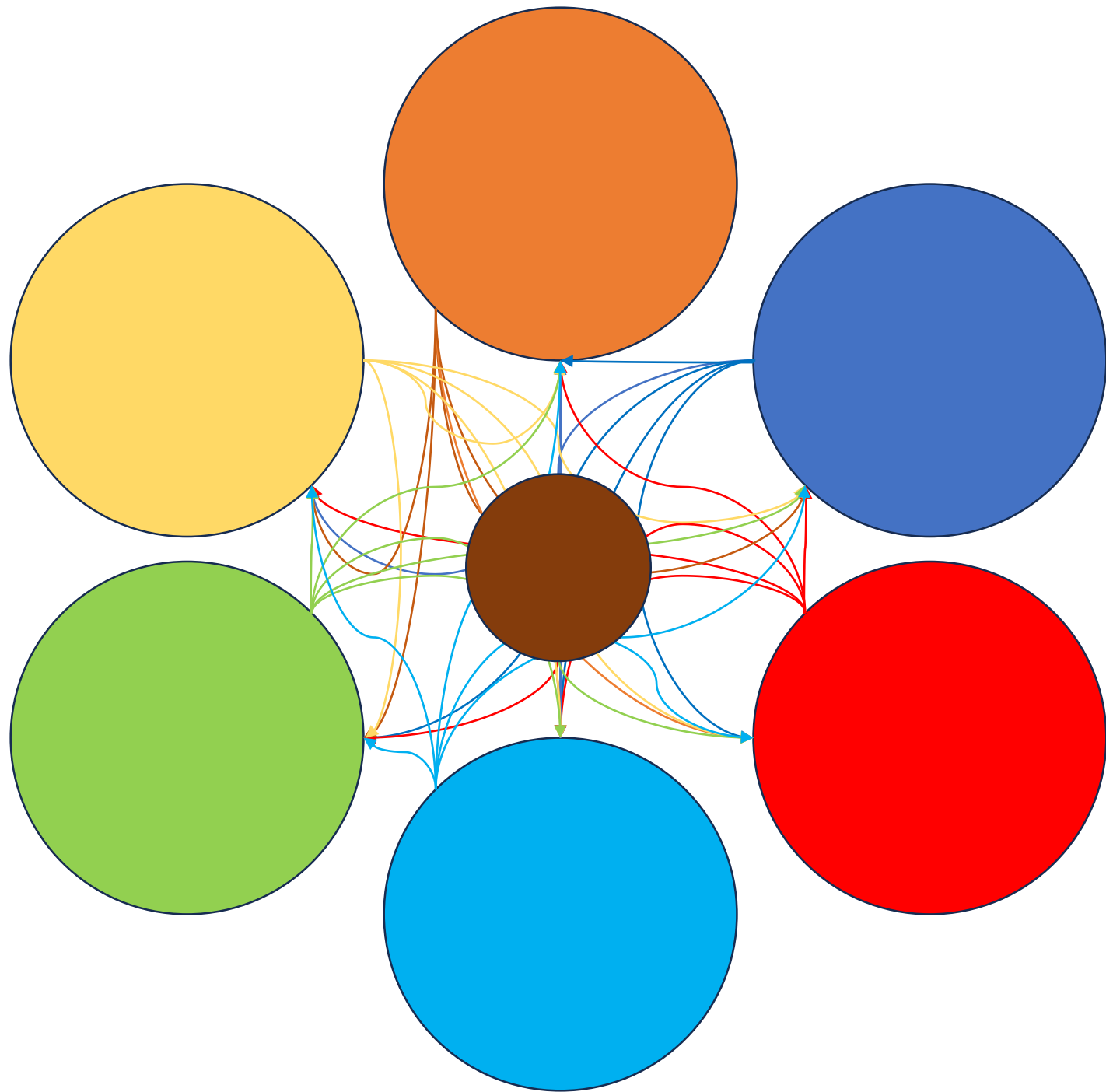
**... and a pdf-file in and off itself is usually a quite microscopic impact**



“WHAT DOES THIS HAVE TO DO  
WITH INTERDISCIPLINARITY?”  
YOU MIGHT ASK







# Challenges around (and how to support) Interdisciplinary Research



Researchers rarely possess the absorptive capacity for integrating inputs from other disciplines.



Someone will have to take upon themselves the role of orchestrating the required mutual exchange of micro-impacts.



We currently lack positions, educations, incentives, and rewards for doing that ... apparently this is a global issue



BTW: The same skills are needed for facilitating the uptake of research among real world practitioners as well as the uptake of real world knowledge in research.

## Recommendation

Challenges around and how to Support  
Interdisciplinary Research

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