CENTER FOR DIGITAL INNOVATION

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Avoiding Type III Errors: Formulating IS Research Problems that Matter

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Presented at the SIG DITE PhD Research Academy

February 23, 2026

When Do Type III Errors Happen

"A researcher answers the wrong question using the right methods."

Mitroff, I. I., and Silvers, A. 2009. Dirty Rotten Strategies: How We Trick Ourselves and Others into Solving the Wrong Problems Precisely, Stanford, CA: Stanford University Press

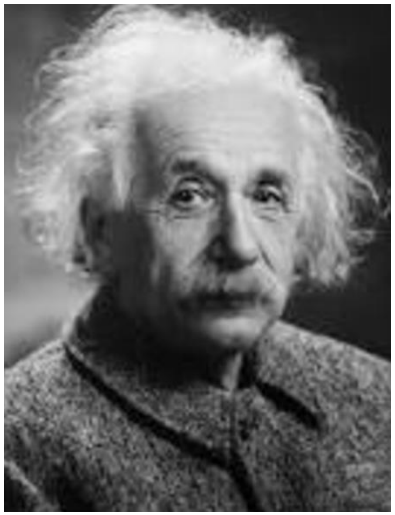
EDITOR'S COMMENTS

Avoiding Type III Errors: Formulating IS Research Problems that Matter

MIS Quarterly

June 2017

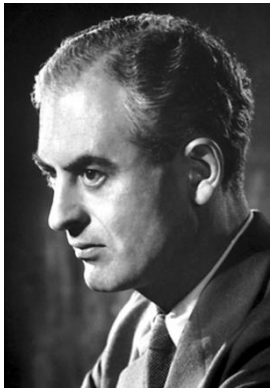
Formulate the Research Problem So the Answer to the Question Will Matter



Albert Einstein

"The formulation of a problem is often ***more essential than its solution***, which may be merely a matter of mathematical or experimental skill."

Important vs. Interesting Problems



P.B. Medawar
Nobel Laureate in Medicine and Physiology, 1979

"Any scientist of any age who wants to make important discoveries must study ***important*** problems. Dull or piffling problems yield dull or piffling answers. It is not enough that a problem should be interesting—***almost any problem is interesting if it is studied in sufficient depth … the problem must be such that it matters what the answer is*—whether to science generally or to mankind**."

Types of Value that the Answer to the Research Question Can Create

H.A. Simon
Nobel Laureate in Economic Sciences, 1978

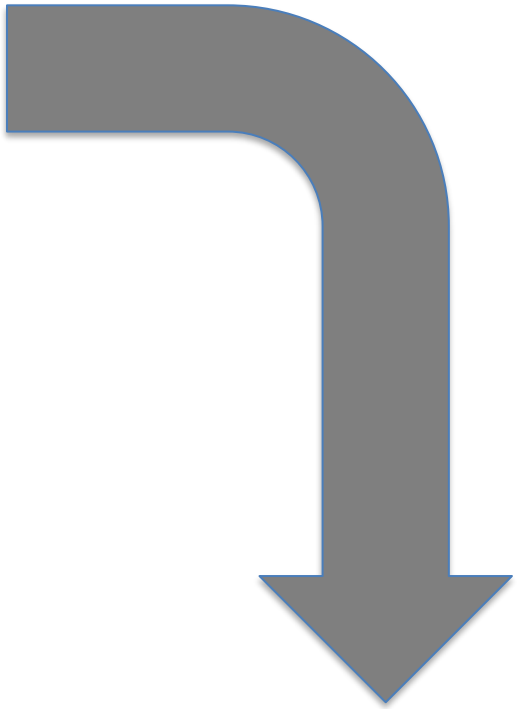
1. **Scholarly**—advancing the area under study in fundamental ways that influence future progress

2. **Practical utility**—changing the state of affairs in the world

3. **Aesthetics**—arising from *powerful simplicity*

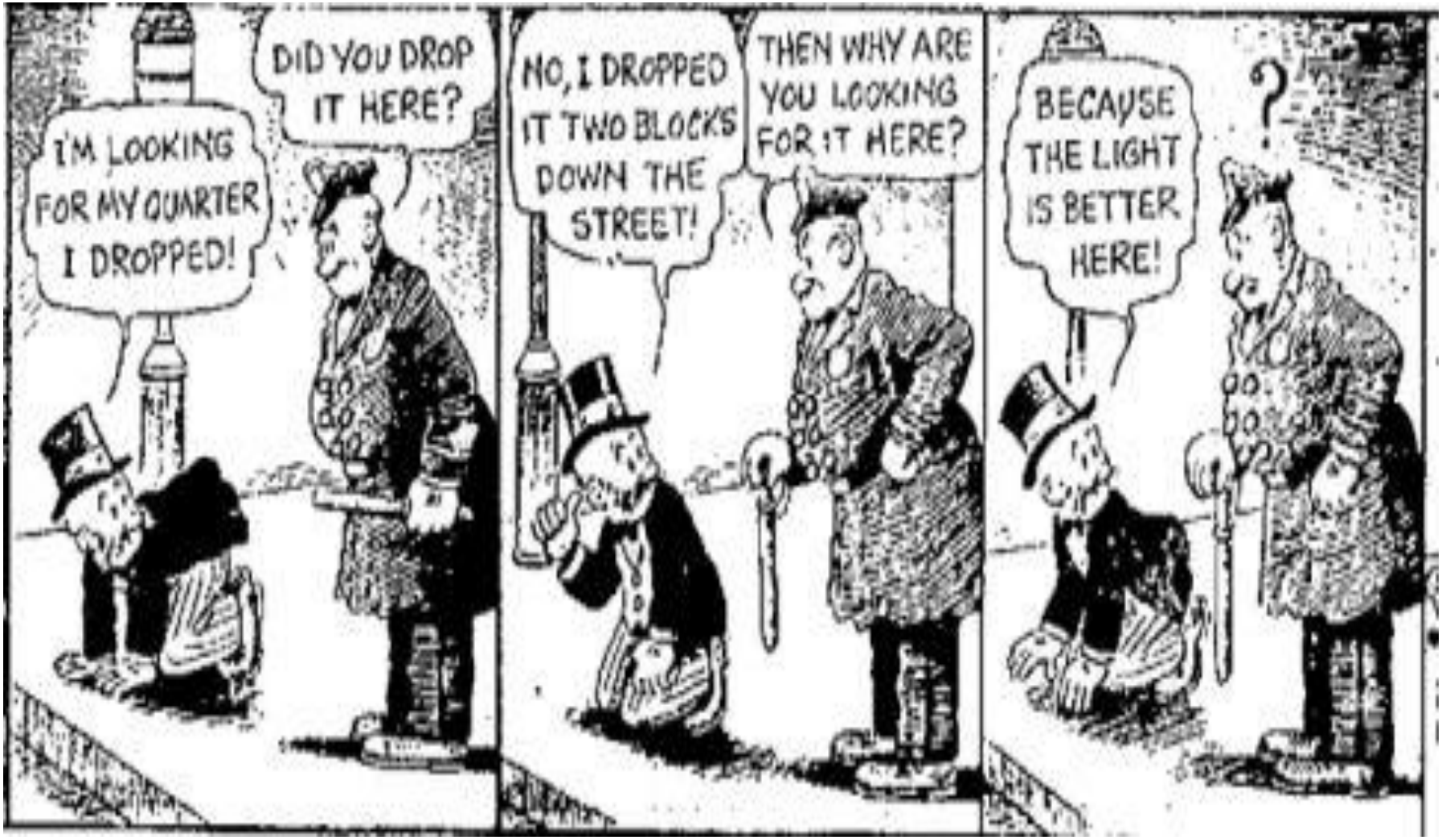
Simon, H. A. 1991. "Random Thoughts on Methods of Research," Unpublished Manuscript, Carnegie Mellon University, Pittsburgh, PA.

Formulate the Research Problem So the Answer to the Question Will Matter



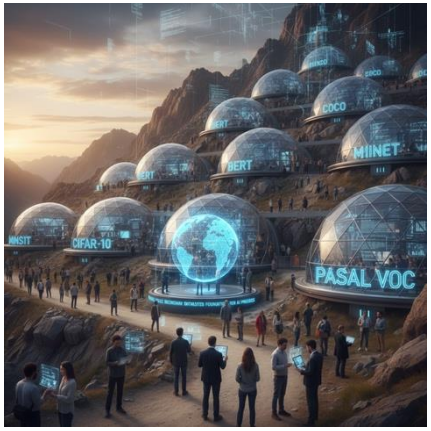
Safeguard Against Key Risks in Formulating Research Problems

First, The Streetlight Effect



The Streetlight Effect—Exacerbated By Easy-to-Access Data

Public-benchmark datasets



Key point: What's available becomes what's studied.

Example: Predicting "trust" from **public reviews**—without engaging theory on reputation or governance.

Platform-generated trace data

Key point: What platforms log becomes what we explain.

Example: Treating clicks as "engagement" while ignoring outcomes and mechanisms.

Pre-trained foundation models

Key point: Availability shifts attention from what problem needs to be solved to what can be easily demonstrated.

Example: Prompting an LLM to classify tickets and writing a paper about accuracy—without considering the organizational problem, workflow redesign, or value/risk tradeoffs.

The Streetlight Effect—
Exacerbated By Competency Traps

Tunnel vision

Exploration, bounded by familiar frames

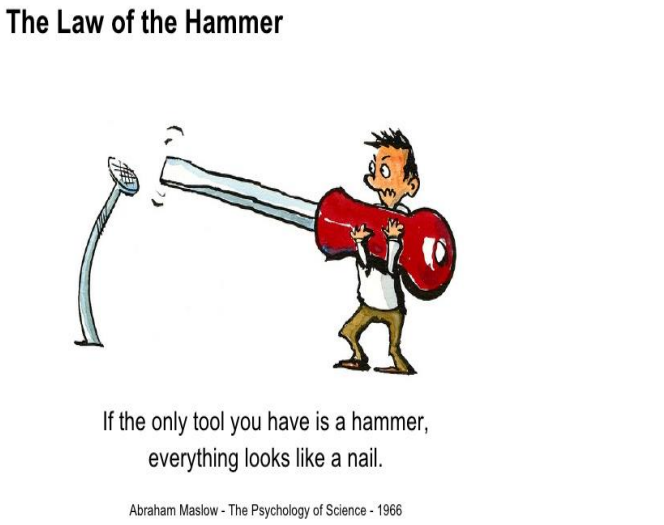
CAUTION

Competency traps: relying on familiar theories, methods, or tools to frame problems—rather than letting the problem dictate the approach

Second, Being Solution-Driven Rather Than Problem-Minded

The solution dictates the question

- A new method is introduced for an unclear or pseudo-problem.
- The problem is framed narrowly to showcase a technique.
- Evaluation focuses on performance gains rather than on problem relevance.



The problem is framed to fit the solution we want to push, rather than being shaped by what the problem itself demands or pulls for.

This is not about what data or methods we know well.
It's about starting with an answer and then looking for a question.

Third, Gap-Spotting and Gap-Patching—But Does the Gap Matter

The critical issue is not whether a gap exists, but ***how*** the gap is formulated—and what answering it enables.

- **Weak framing**: No prior study has examined X in context Y.

  Gaps are not simply discovered in the literature; they are constructed through problem formulation.

- **Stronger framing**: What do we still not understand about Z that limits theory or practice— and why does it matter?

Fourth, Affirming Gravity Works in My Kitchen

"Novelty is an essential component of contributions to science. No prizes are awarded for being second to discover a scientific law" (Simon 1991).

- Novelty of context *by itself* → limited contribution

versus

- Novelty of understanding *as well* — mechanisms, assumptions, or boundary conditions → stronger contribution

- Re-establishing well-established theories or models in a new context *without* yielding new insight into assumptions, mechanisms, or boundary conditions
- Demonstrating that a solution works in a different setting *without* clarifying what changes, what holds, or why
- Applying knowledge from another discipline *without* advancing understanding of the focal IS phenomenon

New contexts matter most when they generate new understanding about the focal IS phenomenon— such as assumptions, boundary conditions, mechanisms, and models.

Fifth, Missing the Forest for the Trees

EDITOR'S COMMENTS

Seeing the Forest for the Trees

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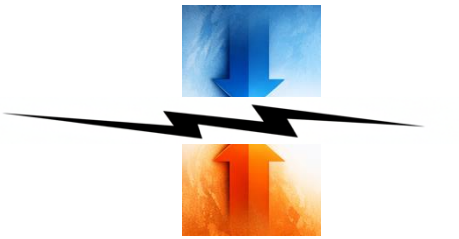
Tension Between Archetypal Problems and Novel Instantiations

Agentic AI coordination represents a novel instantiation of the fundamental problem of digital coordination.

Over-tethered to the Novel Instantiation

Sole focus on the novel instantiation, without evaluating how it relates to the archetypal problem



Archetypal problem

(Digital Coordination)

What doesn't travel down from accreted knowledge on digital coordination:

- Models and theories
- Mechanisms
- Prior assumptions
- Boundary conditions

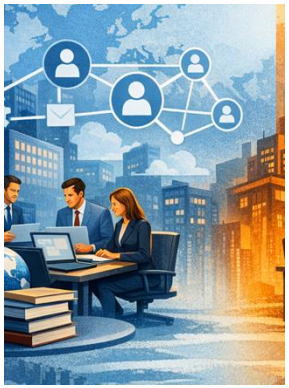
Consequence: reinvention, risk of "old wine, new bottle" outcome

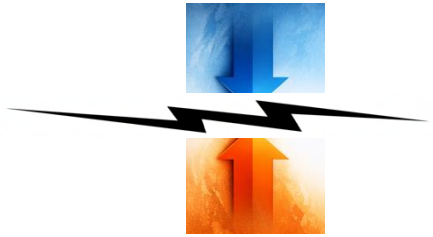
Novel instantiation

(Agentic AI Coordination)

Over-abstracted from the Novel Instantiation

Sole focus on abstraction, without evaluating how the novel instantiation relates to the archetypal problem





Archetypal problem

(Digital Coordination)

What fails to travel up:

- How coordination mechanisms change (or don't) under non-human agency
- Which assumptions embedded in digital coordination theories no longer hold
- Where existing boundary conditions need to be revised or extended.

Consequences: insights locked in the instantiation, do not inform broader understanding of digital coordination.

Novel instantiation

(Agentic AI Coordination)

Managing the Archetype-Instantiation Tension

Agentic AI coordination is a novel instantiation of an archetypal digital coordination problem—how it fits, stretches, or reshapes that archetype is a problem-formulation choice.

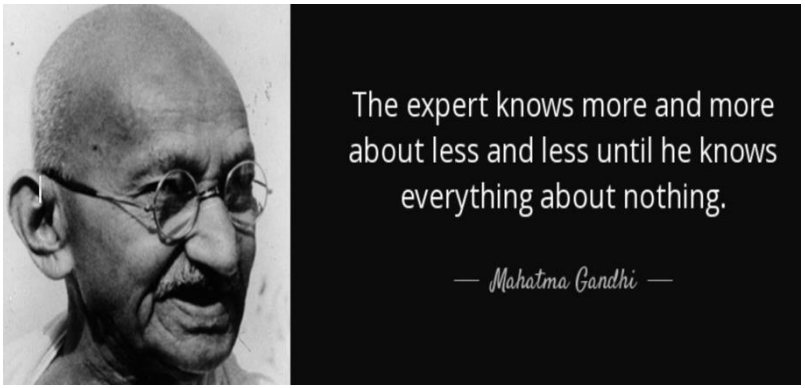
Problem formulation is the skill of managing the tension between archetypal problems and distinctive contexts—and that choice shapes both the question we ask and the contribution we make.

Well-formulated problems enable insights to travel down from accreted knowledge, up as contribution, and forward over time as a sustainable research stream.

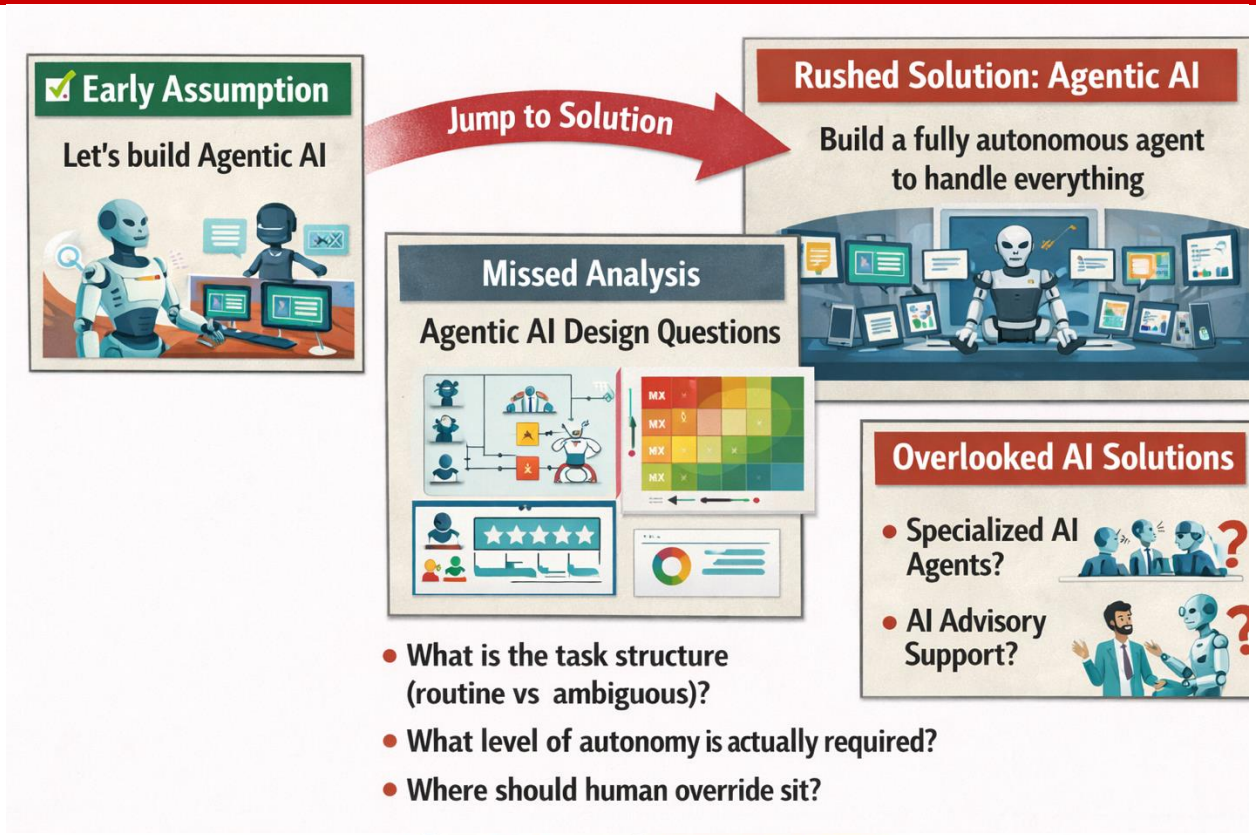
Sixth, The Goldilocks Principle—Excessive or Marginal Scope

Is the problem formulation too narrow seeking to know "*everything about nothing*" or too diffused seeking to know "*nothing about everything*"?

McGrath, J. E., Martin, J. M., and Kulka, R. A. 1982. Judgment Calls in Research (Vol. 2), Beverley Hills, CA: Sage Publications.

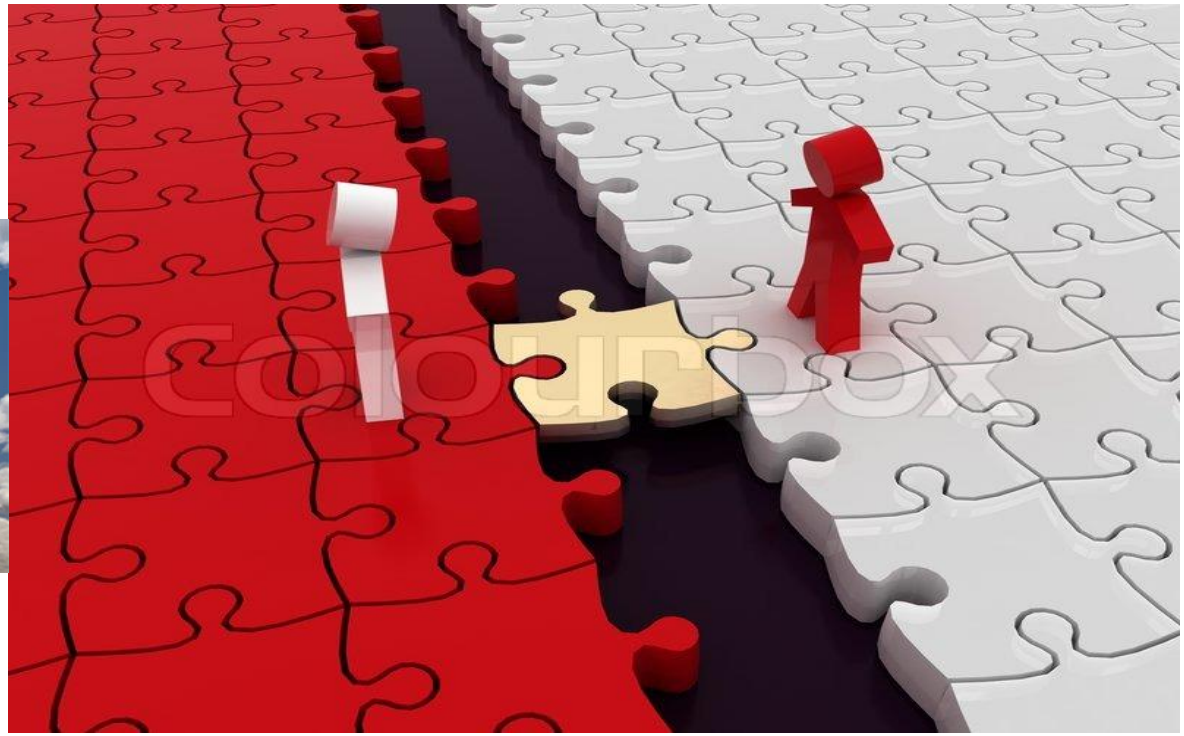


Seventh, Premature Closure in Problem Formulation



Diagnostic errors contribute to 6–17% of adverse medical events, with nearly 30% driven by cognitive failures—premature closure chief among them (*Joint Commission, October 2016*).

Generating Diverse Problem Formulations With Cross-Paradigm Combinative Practices



EDITOR'S COMMENTS

Beyond Outdated Labels: The Blending of IS Research Traditions

MIS Quarterly Vol. 42 No. 1 pp. iii-vi/March 2018

Table 1. Cross-Paradigm Combinative Practices in IS Research			
		Non-Paradigmatic Practices	
		Theoretical Perspective	**Method**
Paradigmatic Practices	**Theoretical Perspective**	**Cross-Paradigm Theoretical Combination** ***Motivation***: Challenge assumptions, redefine boundary conditions, re-conceptualize constructs and relationships, and gain a more holistic understanding through cross-paradigm theorizing	**Paradigmatic Theory-Non-Paradigmatic Method Combination** ***Motivation***: Develop, evaluate, and refine a paradigmatic theory by applying a method from another paradigm to observe, analyze, and interpret phenomena in novel ways
	Method	**Paradigmatic Method-Non-Paradigmatic Theory Combination** ***Motivation***: Leverage a theoretical perspective from another paradigm to illuminate the application of a paradigmatic method in the research process	**Cross-Paradigm Methods Combination** ***Motivation***: Generate complementary insights by applying methods with different objectives, assumptions, data requirements, and processing approaches

Table 1. Cross-Paradigm Combinative Practices in IS Research			
		Non-Paradigmatic Practices	
		Theoretical Perspective	**Method**
Paradigmatic Practices	**Theoretical Perspective**	**Cross-Paradigm Theoretical Combination** ***Example***: Behavioral and economics theories on influence mechanisms combined to understand how a platform's design affects the propagation of social influence in online networks	**Paradigmatic Theory-Non-Paradigmatic Method Combination** ***Example***: Behavioral/economics IS theoretical perspectives combined with computational methods such as topic modeling, text mining, and image recognition to develop measures of constructs
	Method	**Paradigmatic Method-Non-Paradigmatic Theory Combination** ***Example*:** IS design science research combined with behavioral theoretical perspectives on IS use to inform, evaluate, and refine artifact design; insights can also be used to revise the informing theoretical perspectives.	**Cross-Paradigm Methods Combination** ***Example***: Econometric analysis of archival data for causal identification combined with primary data collected using surveys or interviews to illuminate the underlying mechanisms; Grounded theory method to discover concepts and relationships combined with computational approaches applied to large corpus of text to discover topics and relationships.

Problem Re-formulation: Iterative Learning of the Problem

Interventions / Experiments		Frequency: Low	Frequency: High
Throughput	Low		
	High		

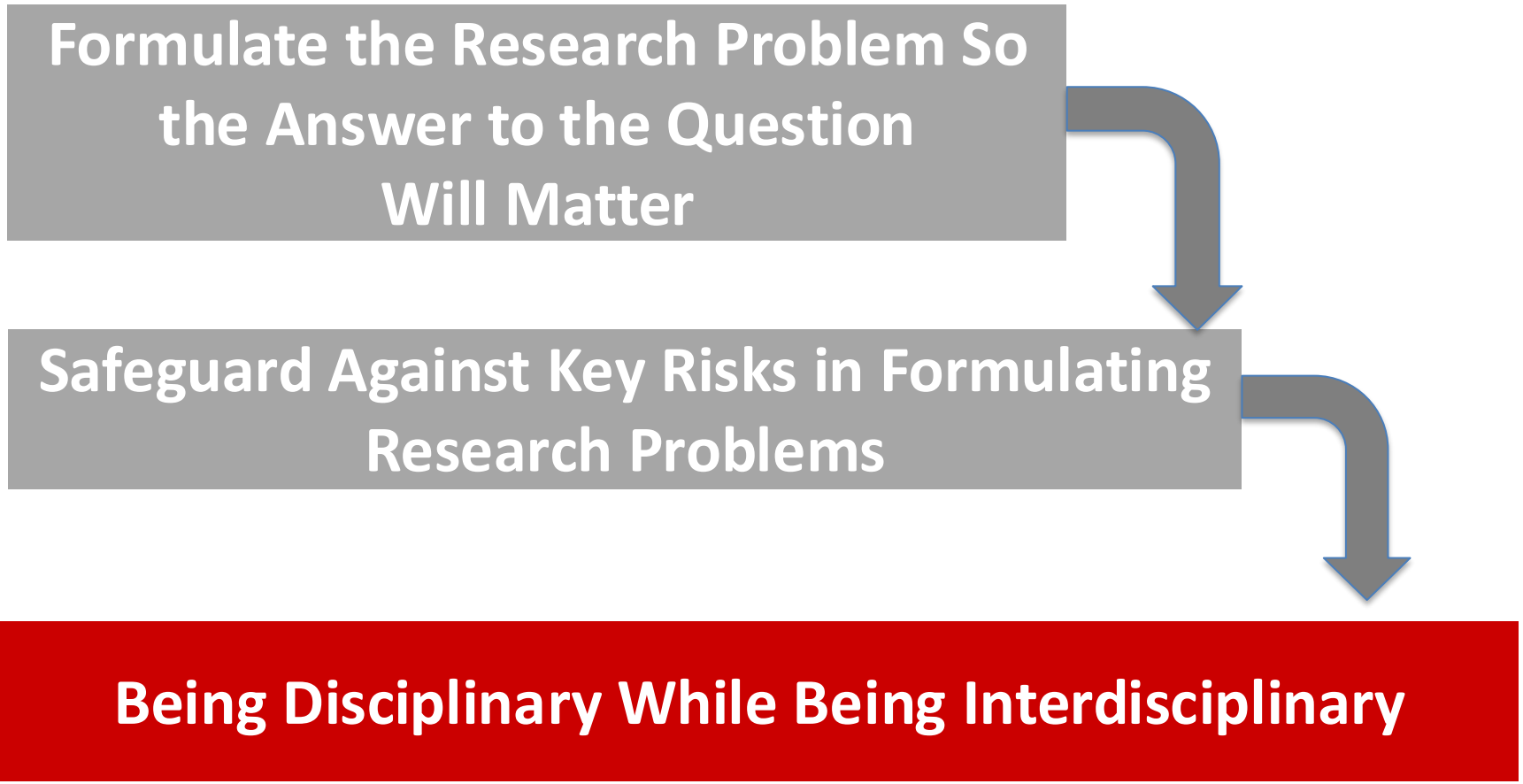
NETFLIX

Microsoft

OpenAI

ANTHROP\C

More frequent, higher-throughput interventions/experiments scale learning about the problem.

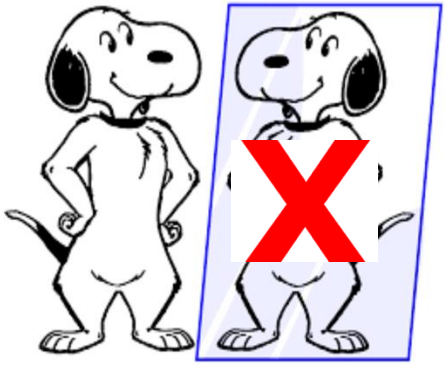

Formulate the Research Problem So the Answer to the Question Will Matter
Safeguard Against Key Risks in Formulating Research Problems
Being Disciplinary While Being Interdisciplinary

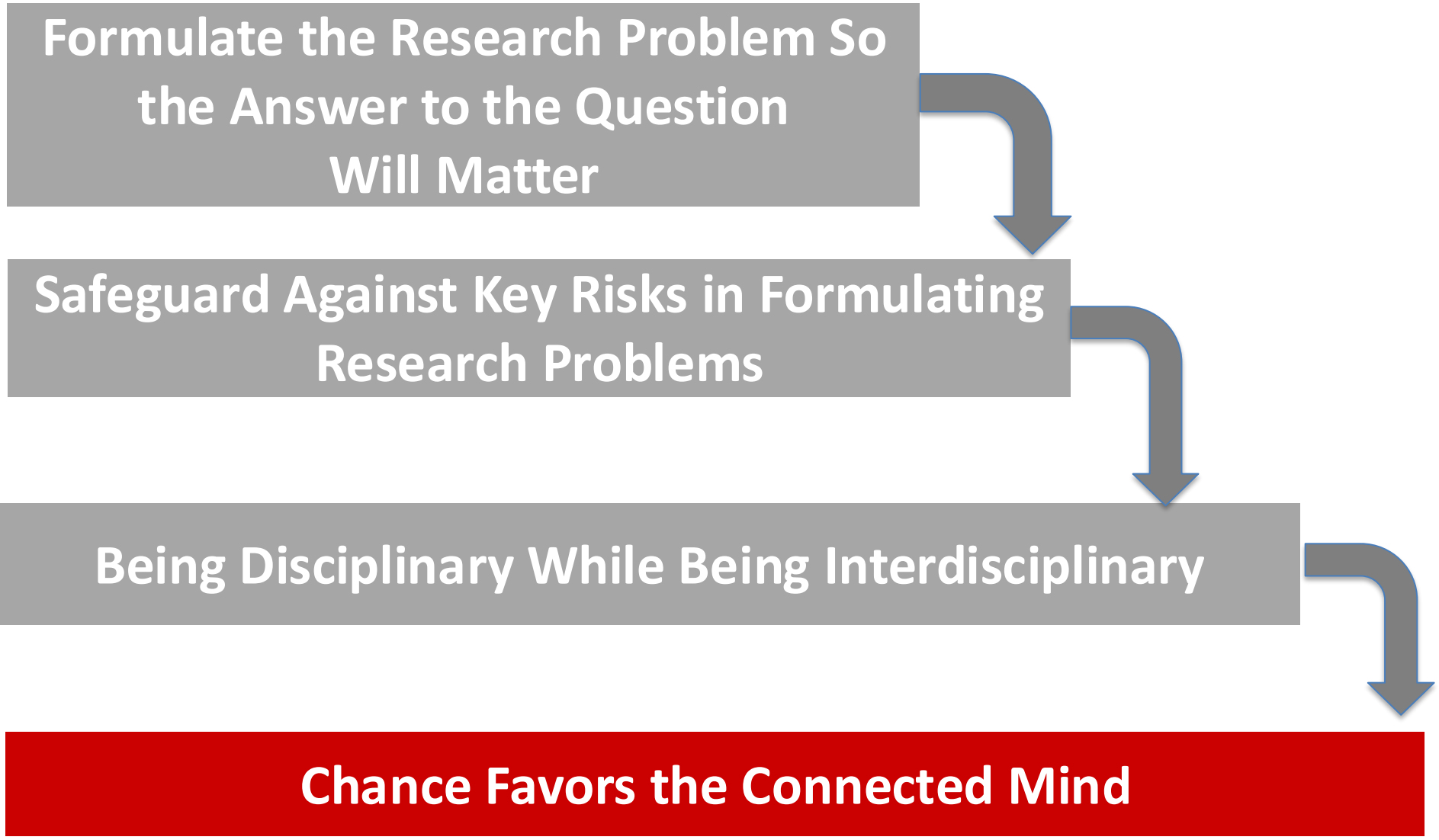
Formulating Problems with Salience on IS

Shifting boundaries of digital phenomena

Formulate problems with IS in foreground—*not background.*

Make disciplinary IS contributions, while contributing to other disciplines.

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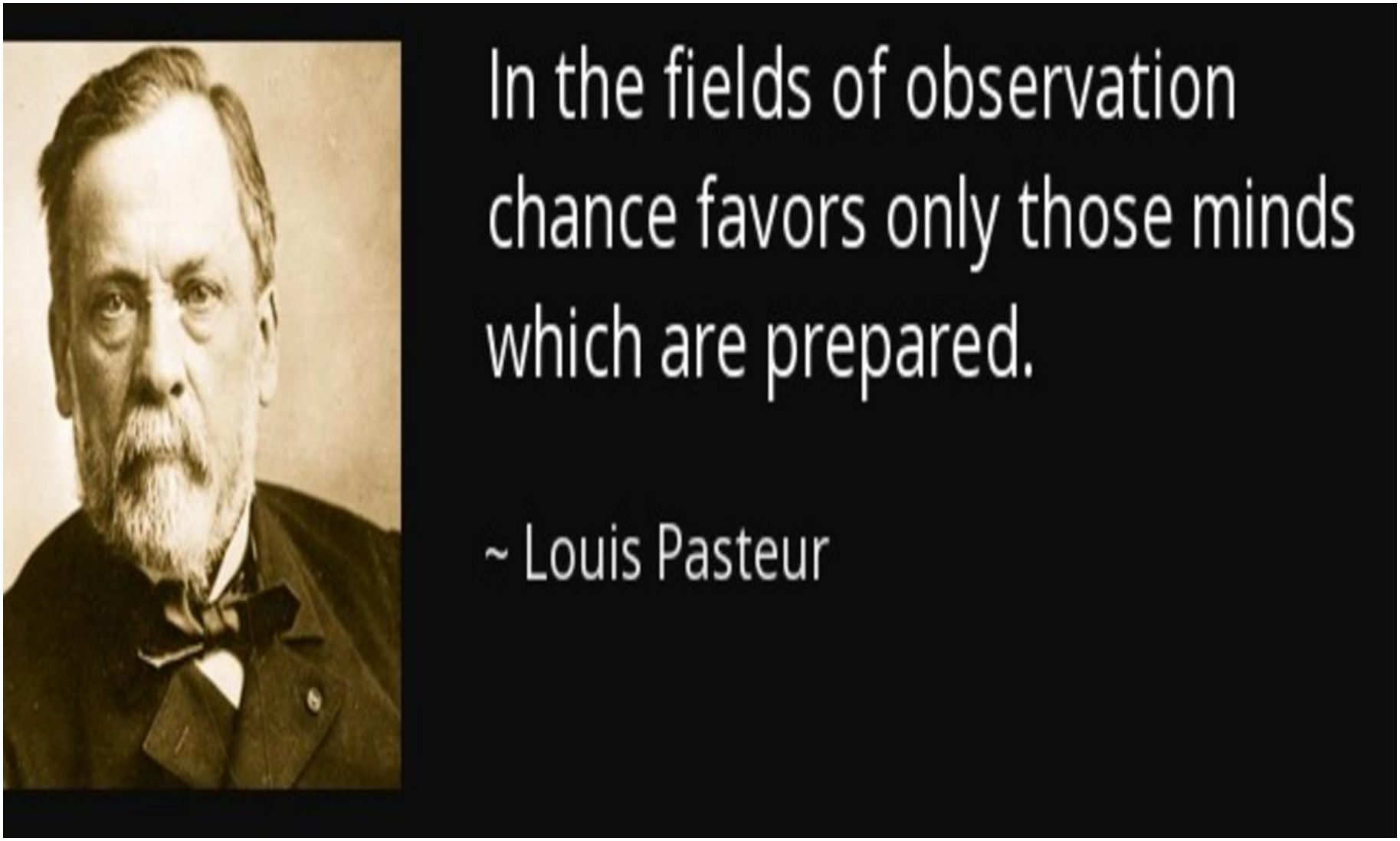
Safeguard Against Key Risks in Formulating Research Problems
Being Disciplinary While Being Interdisciplinary
Chance Favors the Connected Mind

Role of Individual Preparedness



The Prepared Mind:
Lone Genius, Suddenly Struck By Inspiration

Eureka moment of sudden clarity!

Johnson, S. 2010. Where Good Ideas Come From: The Natural History of Innovation, New York: *Riverhead* Books, Penguin Group.

The Connected Mind:
The Generative Capacity of Liquid Networks

- **Networked, collaborative**
- **Triggers**
- **Exaptation**

Johnson, S. 2010. Where Good Ideas Come From: The Natural History of Innovation, New York: *Riverhead* Books, Penguin Group.

The Connected Mind: Research *with* Practice

Research *with* (not for) practice to advance scientific knowledge *and* practical utility

If the duty of the intellectual in society is to make a difference, the [academic] research community has a long way to go to realize its potential.

The action steps to resolve the old dichotomy of theory and practice were often portrayed with the minimalist request for researchers to engage with practitioners through more accessible dissemination.

But dissemination is too late if the wrong questions have been asked. A wider and deeper form of engagement between researchers and practitioners is needed to co-produce knowledge.

Andrew Pettigrew,

"Management Research After Modernism," *British Journal of Management*, 2001, vol. 12, iss. SPI/1, pp. S61-S70

10

EDITOR'S COMMENTS

Engaged Scholarship: Research *with* Practice for Impact

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June 2019

Developing the Connected Mind

H.A. Simon
Nobel Laureate in Economic Sciences, 1978

It is not merely a matter of constituting a team with members having complementary specializations in knowledge and skills, but requires "***individual members of the team to become multi-disciplinary in knowledge, if not skills***" (Simon 1991, p. 10).

Simon, H. A. 1991. "Random Thoughts on Methods of Research," Unpublished Manuscript, Carnegie Mellon University, Pittsburgh, PA.


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