Building a research culture that is open, rigorous, and reproducible

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Senior Director of Research

CENTER FOR
OPEN SCIENCE

Why is research credibility lower than expected?

Low power and precision

Questionable research practices

Low rigor

Publication bias

Lack of replication

Limitations of null hypothesis significance testing

Sterling, 1959; Cohen, 1962; Lykken, 1968; Tukey, 1969; Greenwald, 1975; Meehl, 1978; Rosenthal, 1979

How can research credibility be improved?

Larger samples

Transparency

Distinguish planned versus unplanned

Report all outcomes

Replication

Aggregate evidence

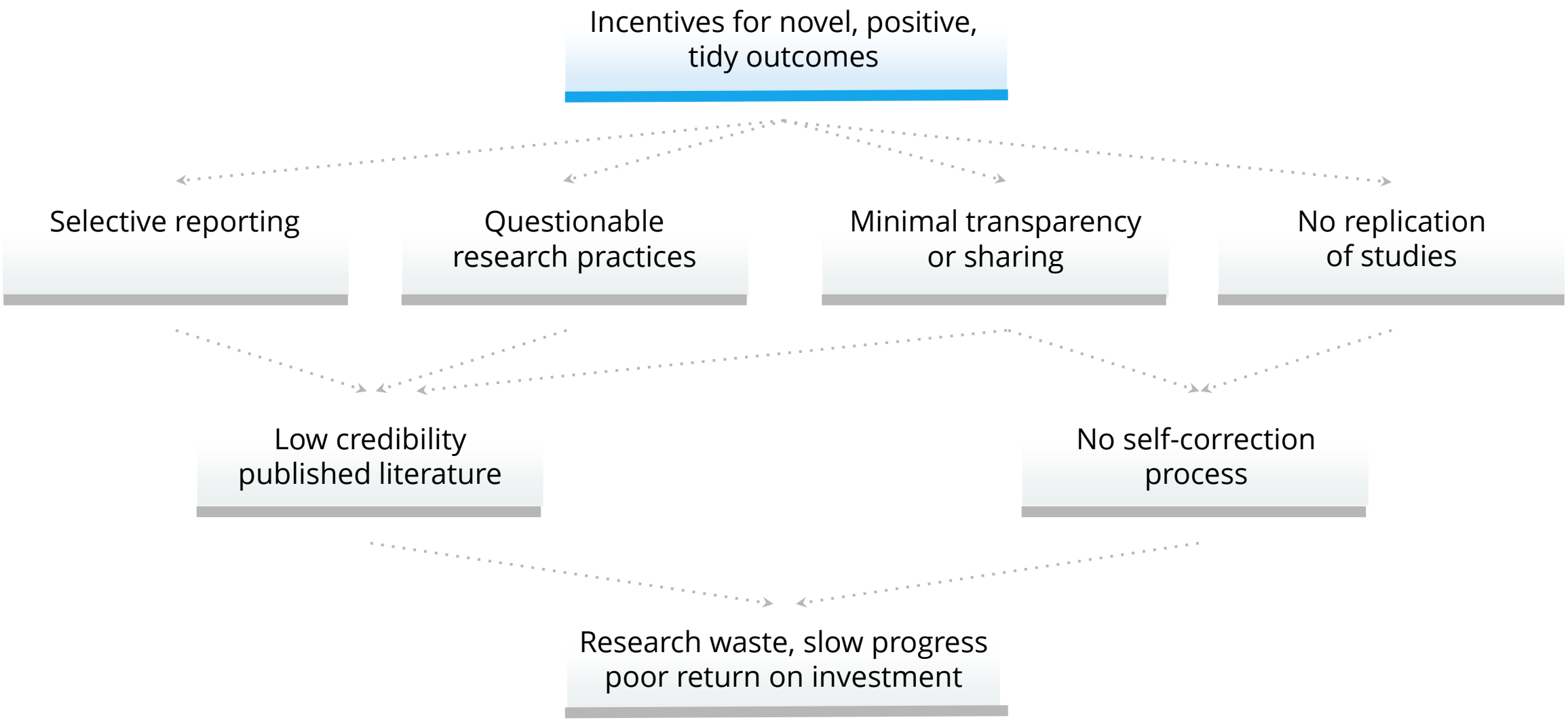
Narrow use of null hypothesis significance testing

Sterling, 1959; Cohen, 1962; Lykken, 1968; Tukey, 1969; Greenwald, 1975; Meehl, 1978; Rosenthal, 1979

“Incentives for individual success are focused on getting it published, not getting it right.”

Nosek, Spies, & Motyl (2012)

A dysfunctional reward system



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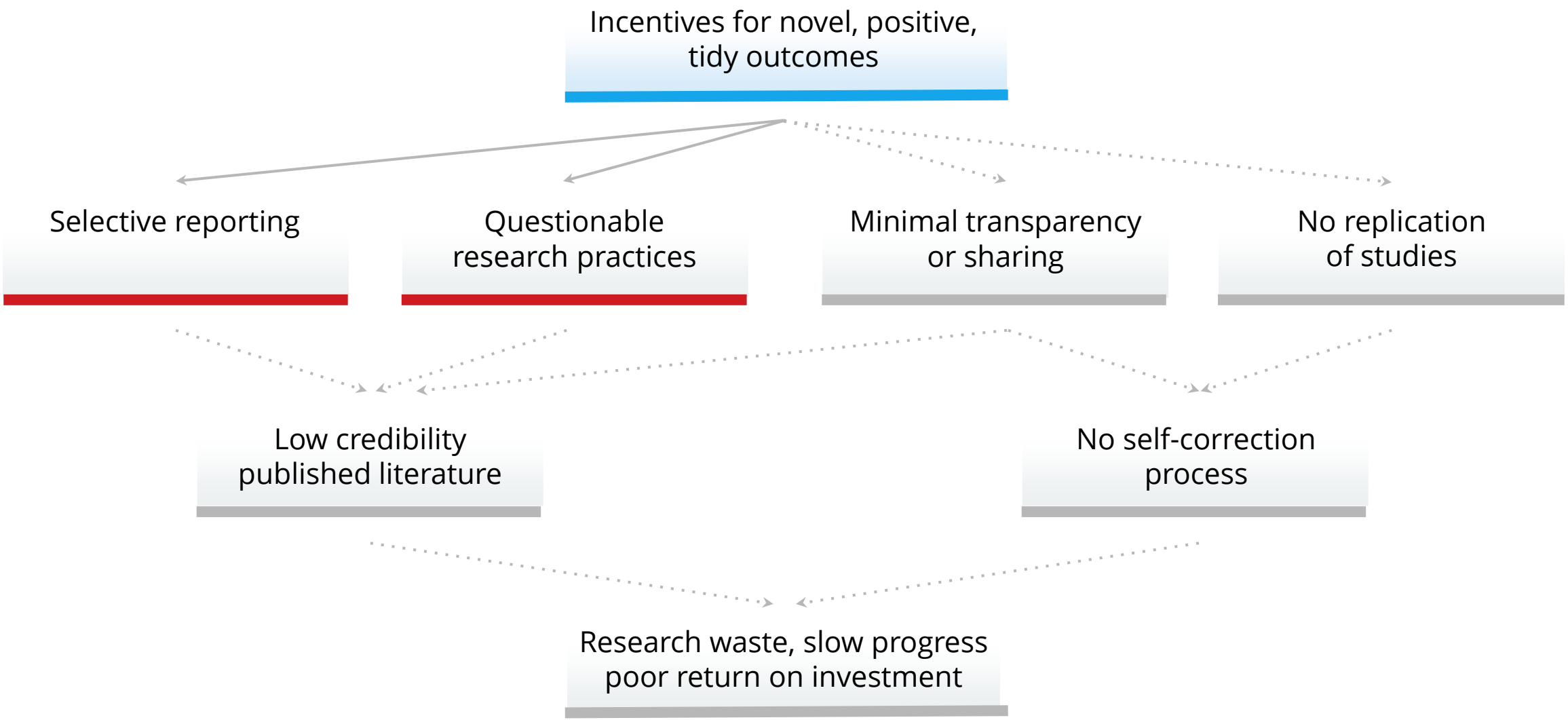

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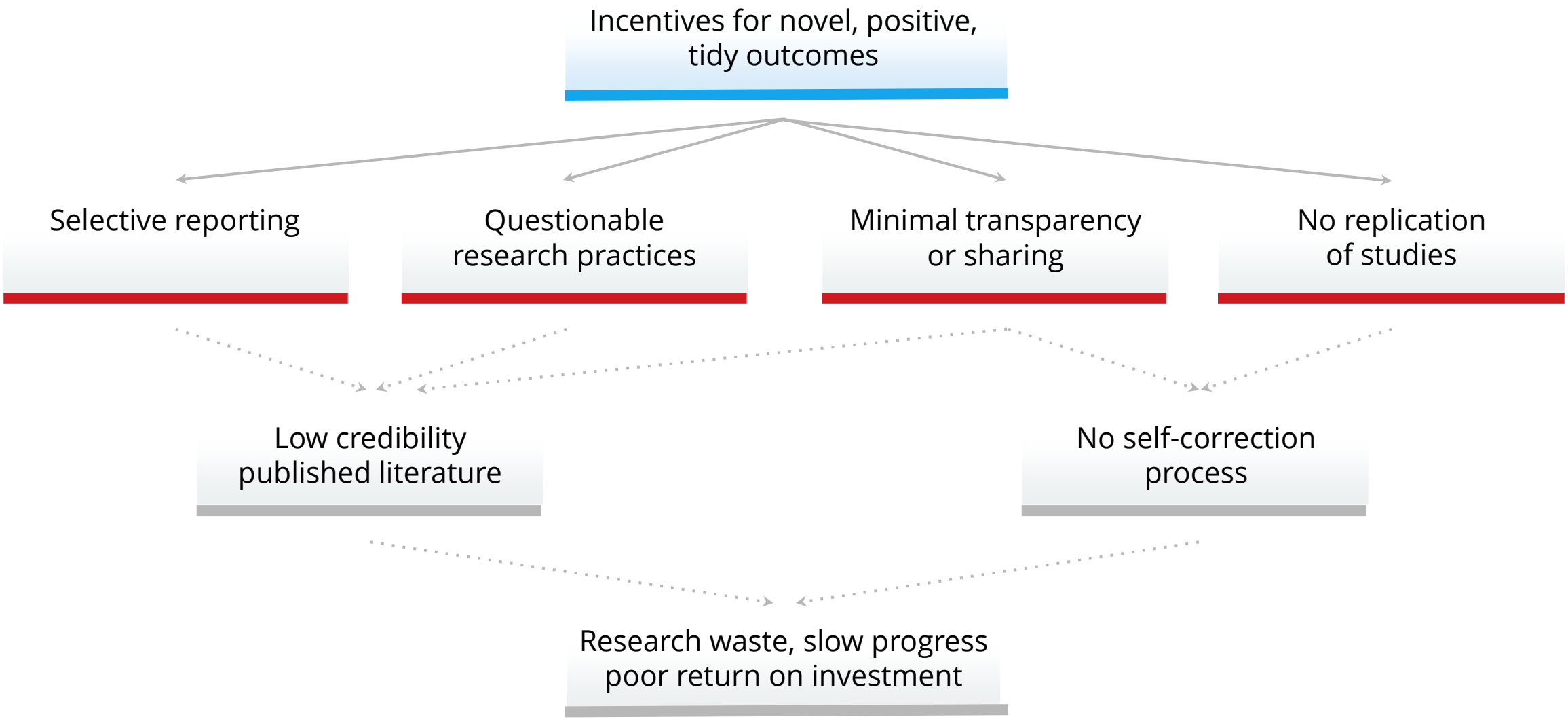

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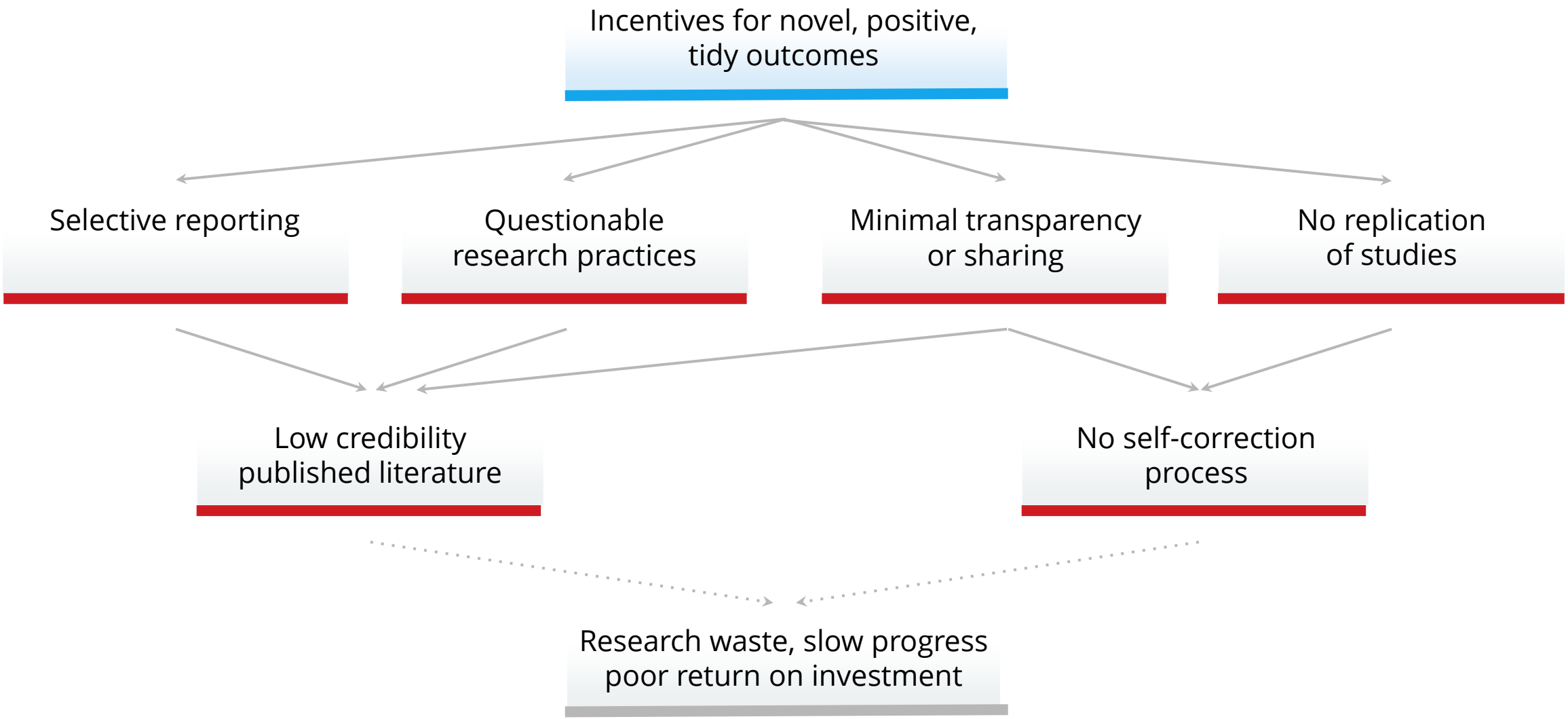

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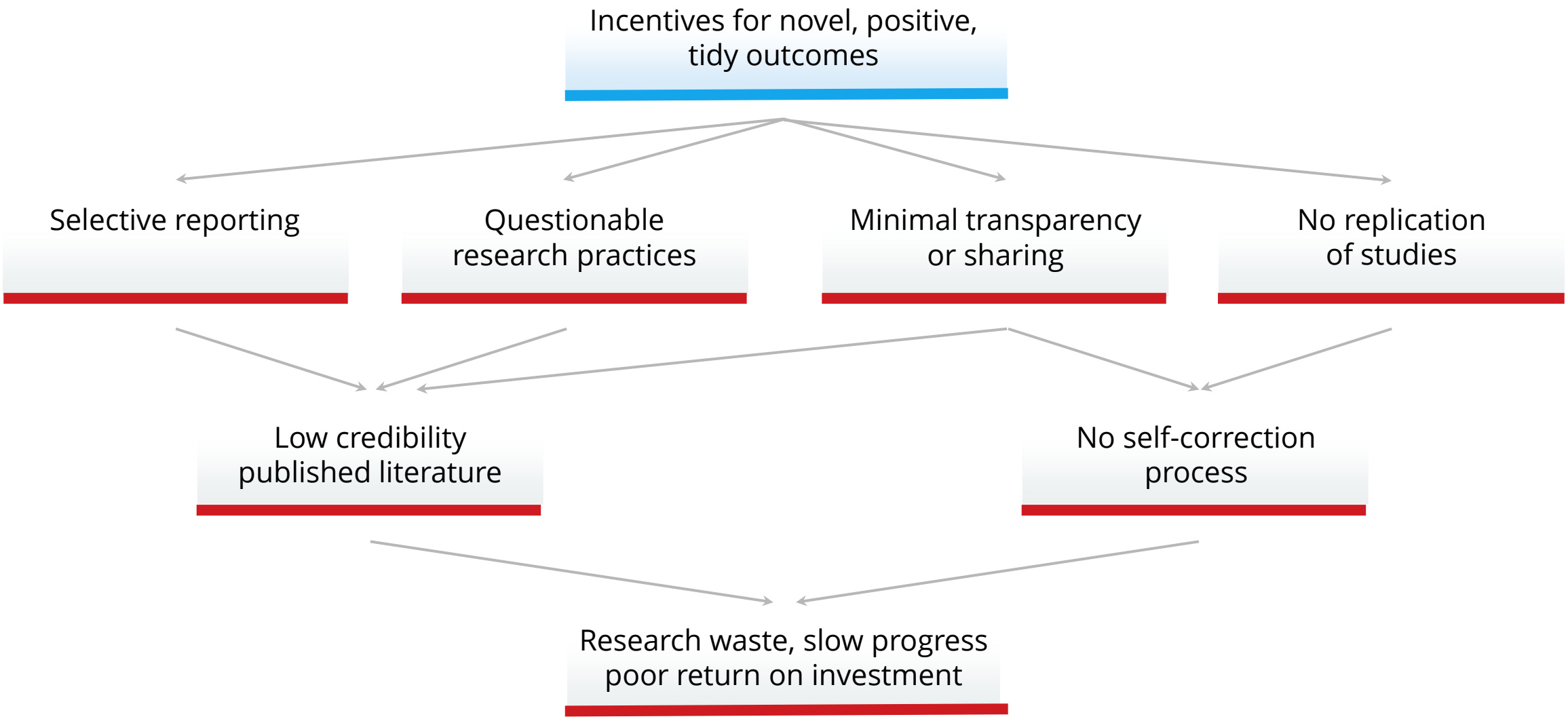


Solutions

OPEN DATA

OPEN MATERIALS

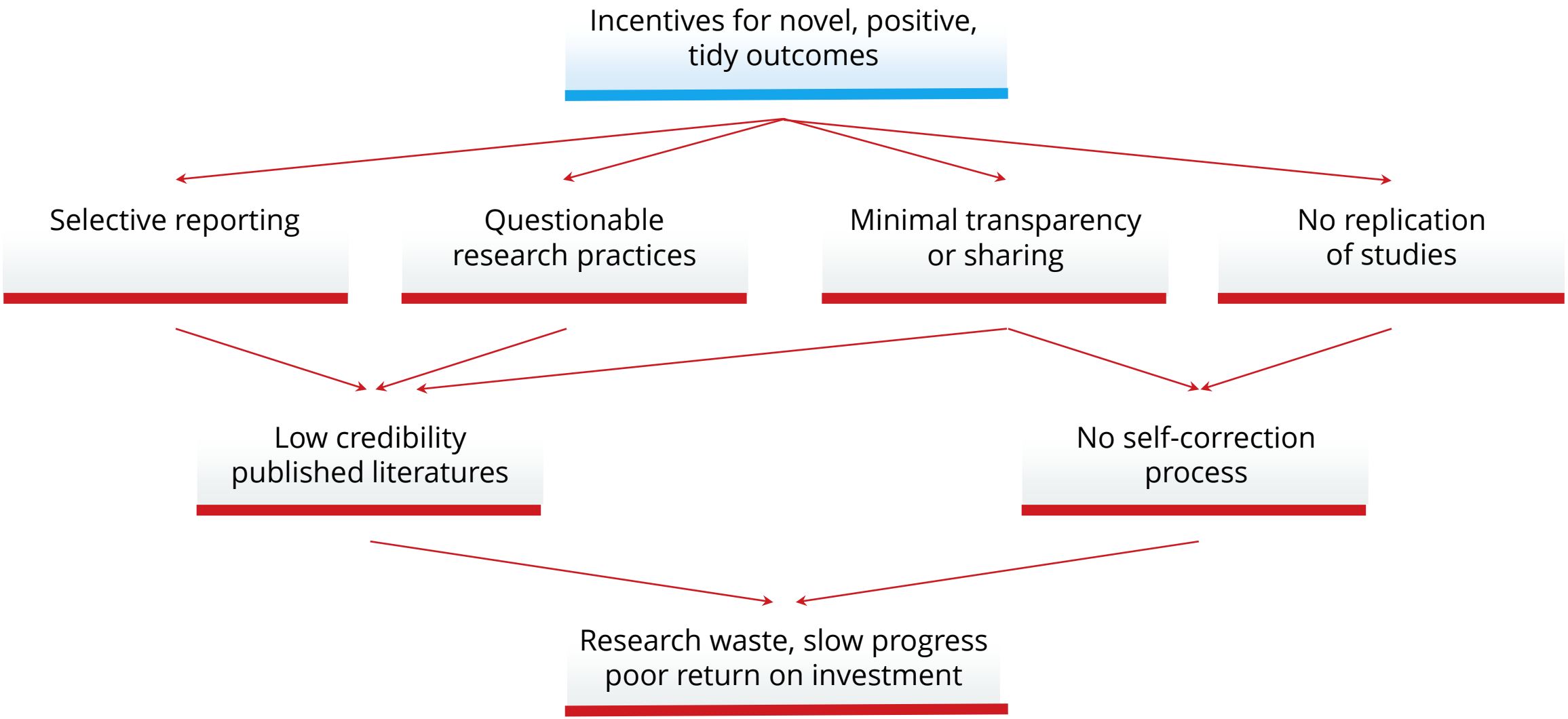
OPEN CODE

PREREGISTERED

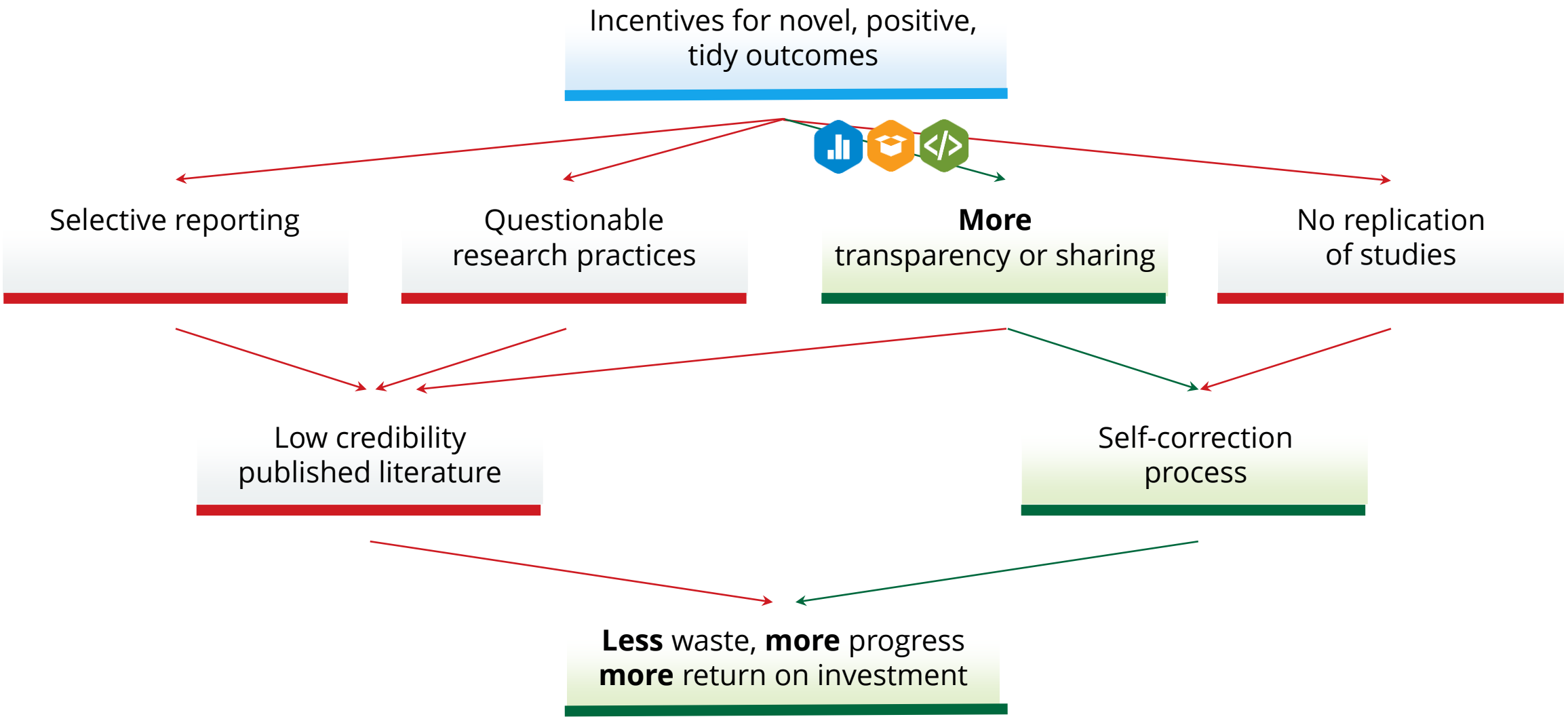
REGISTERED REPORTS

REPLICATION

Improving the reward system



Improving the reward system



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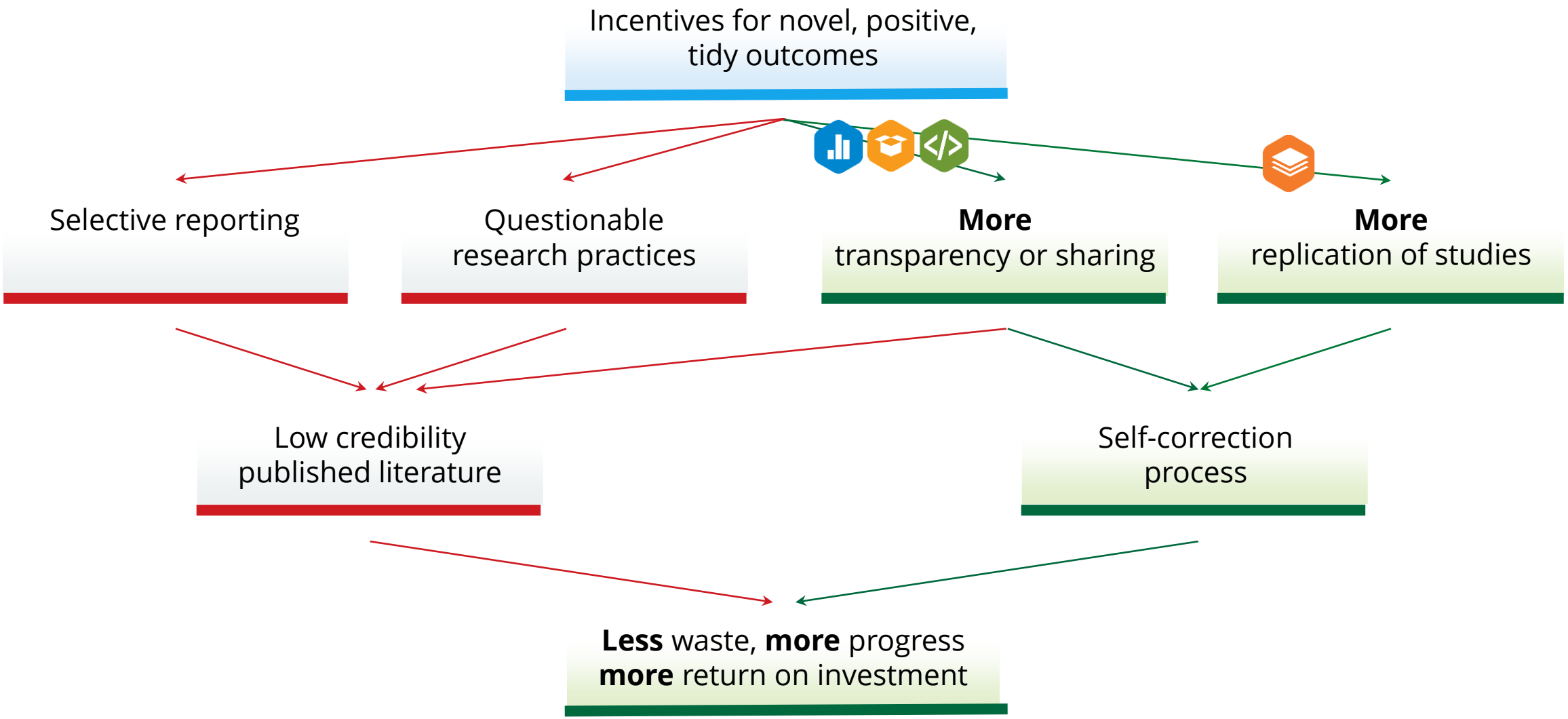

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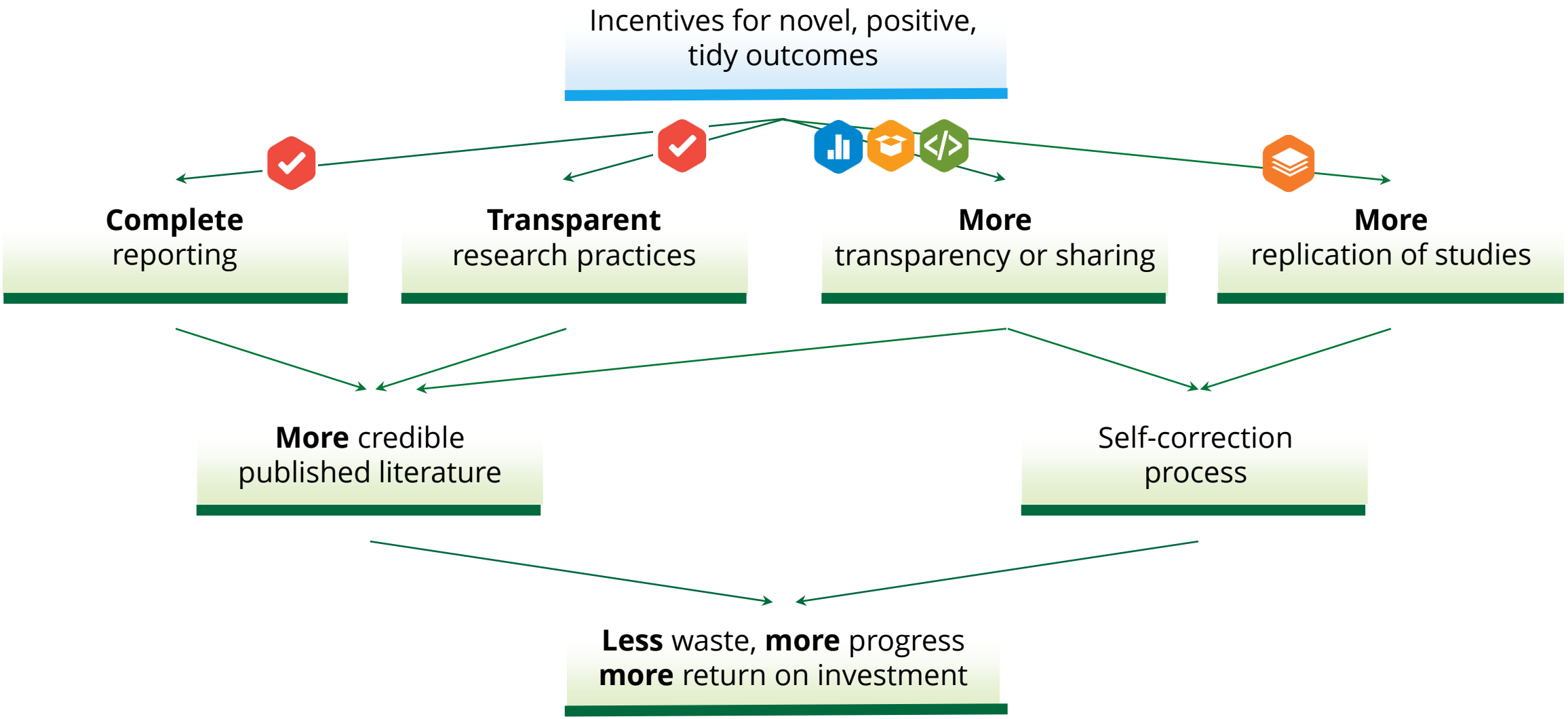

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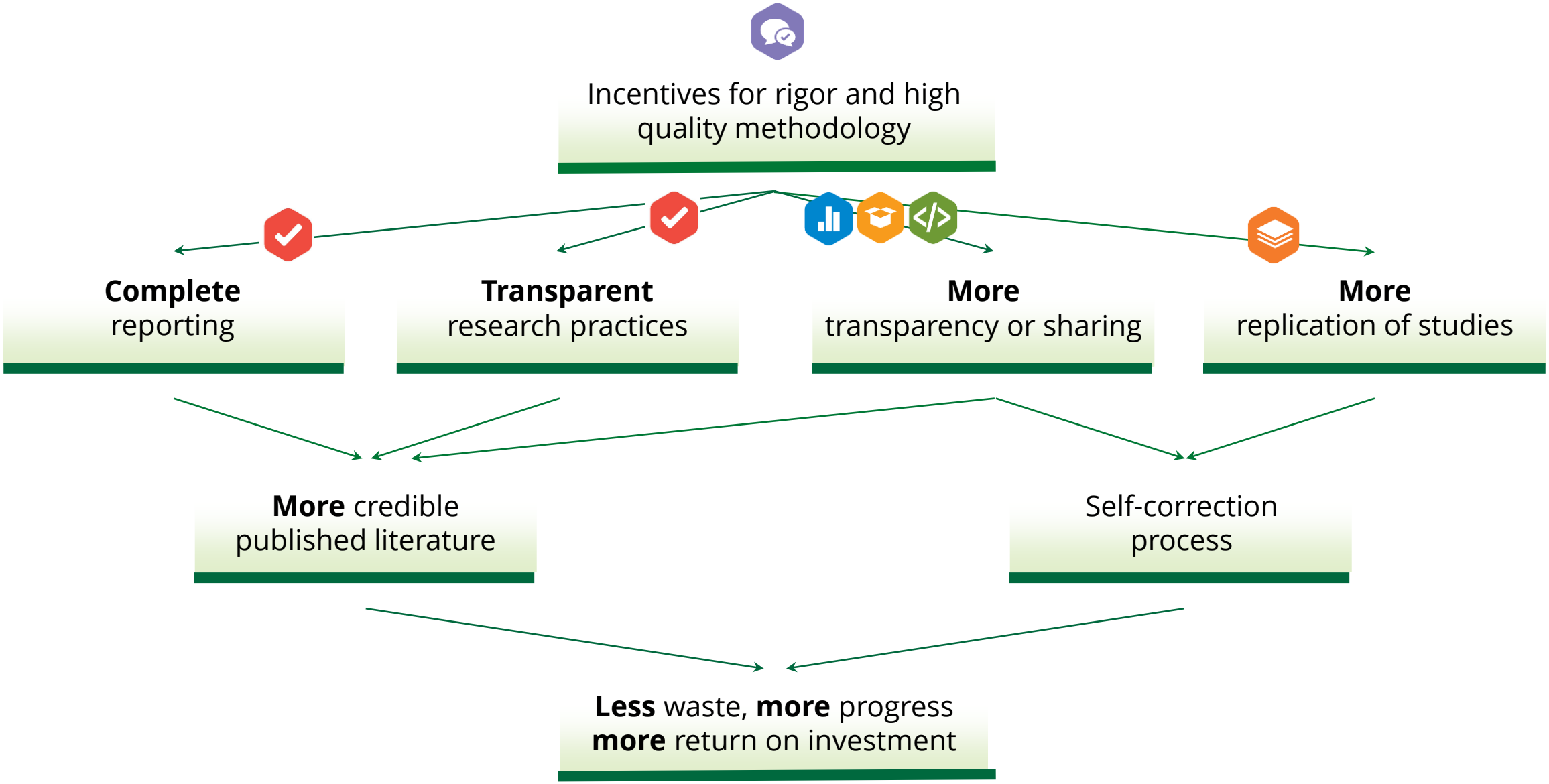


SOCIETIES

FUNDERS

JOURNALS

INSTITUTIONS

Situational Analysis

Complex system

Decentralized

Multi-level

Heterogeneity of Actors

Key attributes

Asset

Evidence of shared values

Legitimation through signaling

Enabler

Technological innovation

Opportunity

Self organization

Is possible under these conditions

Factors influencing rate of adoption

Relative advantage

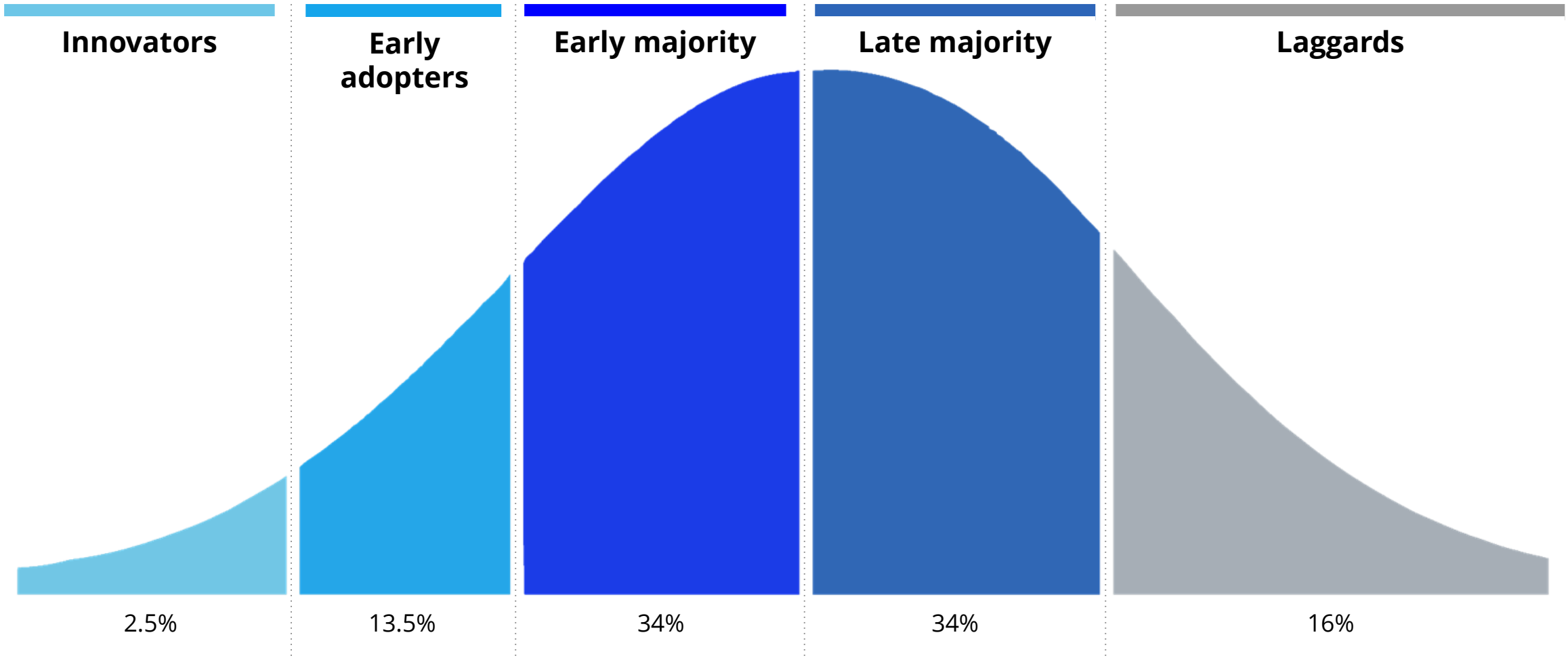
Compatibility

Complexity

Trialability

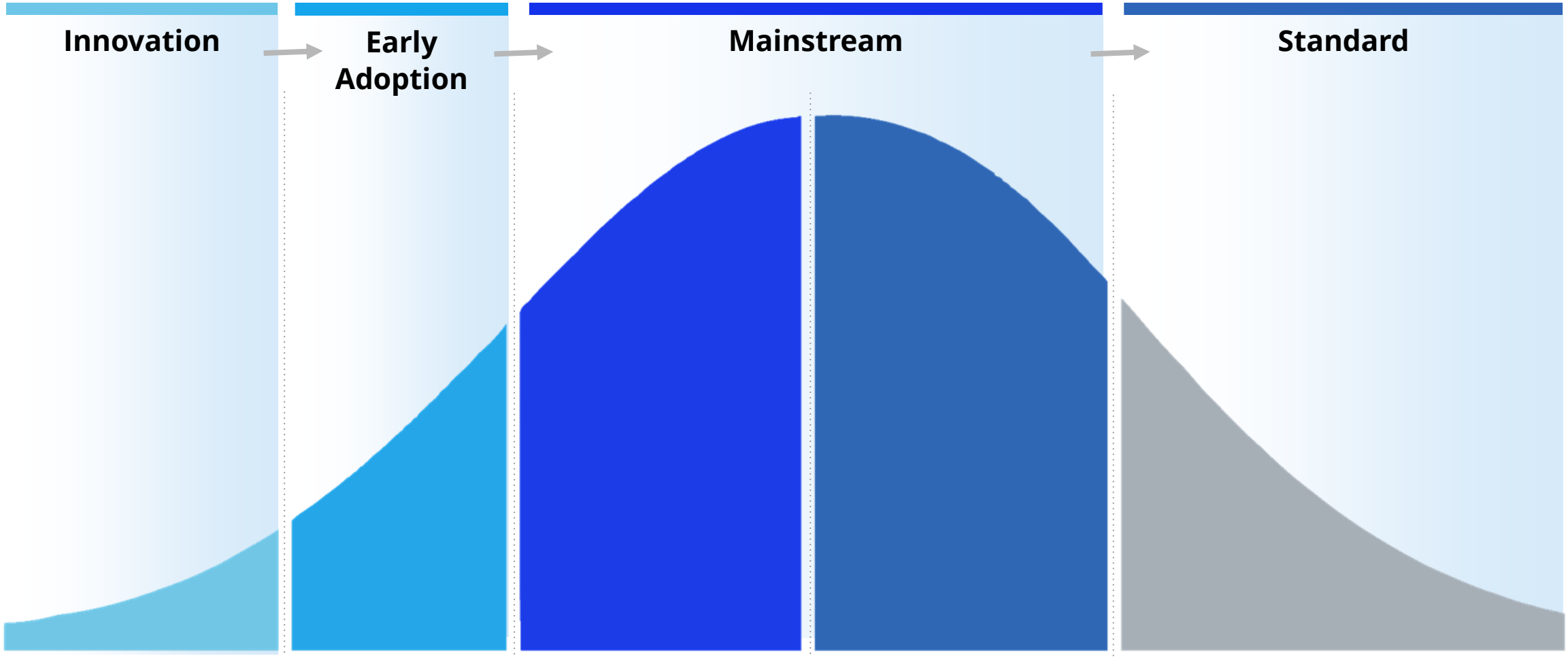
Observability

Diffusion of innovations



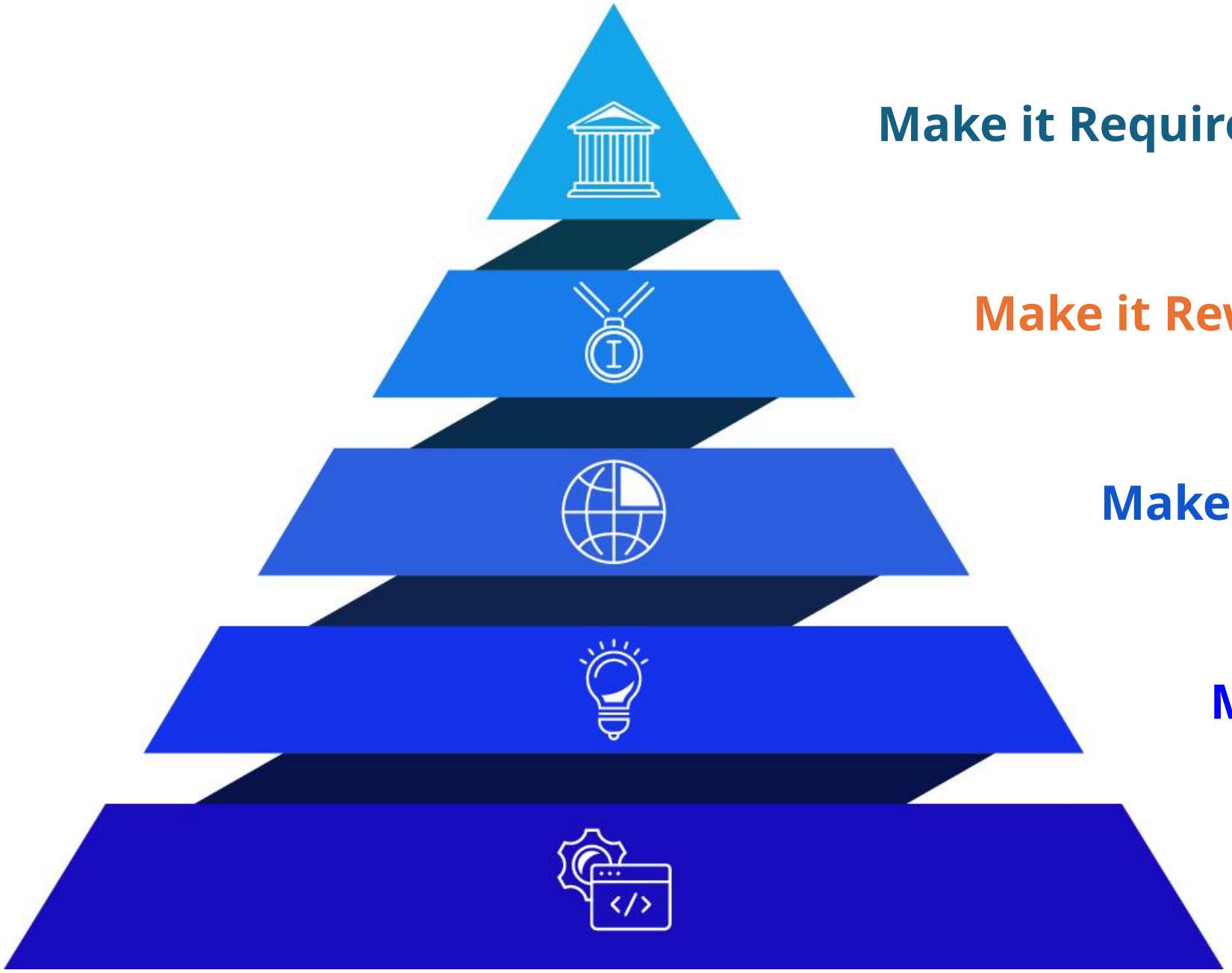
Diffusion of Innovations; Rogers, 1963

Diffusion of innovations for research culture



Diffusion of Innovations; Rogers, 1963

A Theory of Change



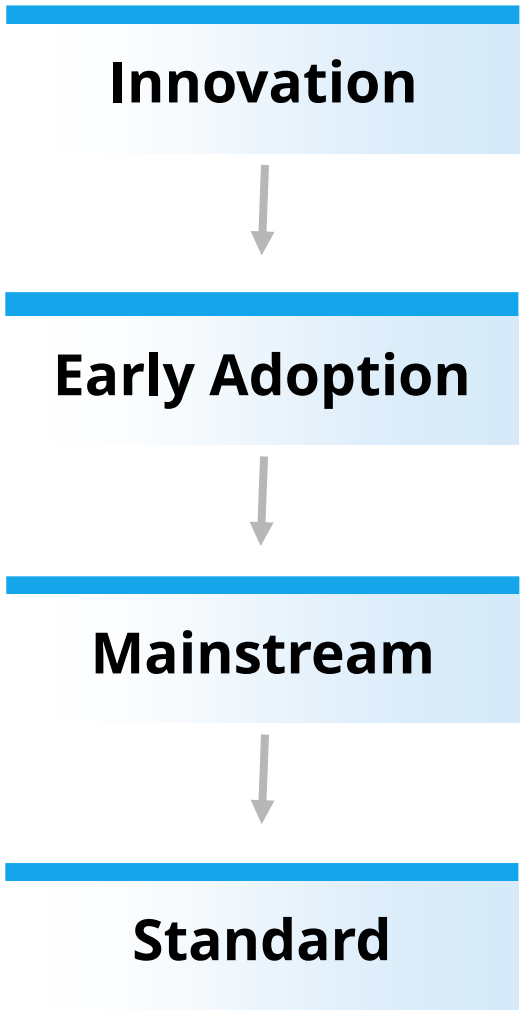
Make it Required

Make it Rewarding

Make it Normative

Make it Easy

Make it Possible



Make it Possible

Make it Easy

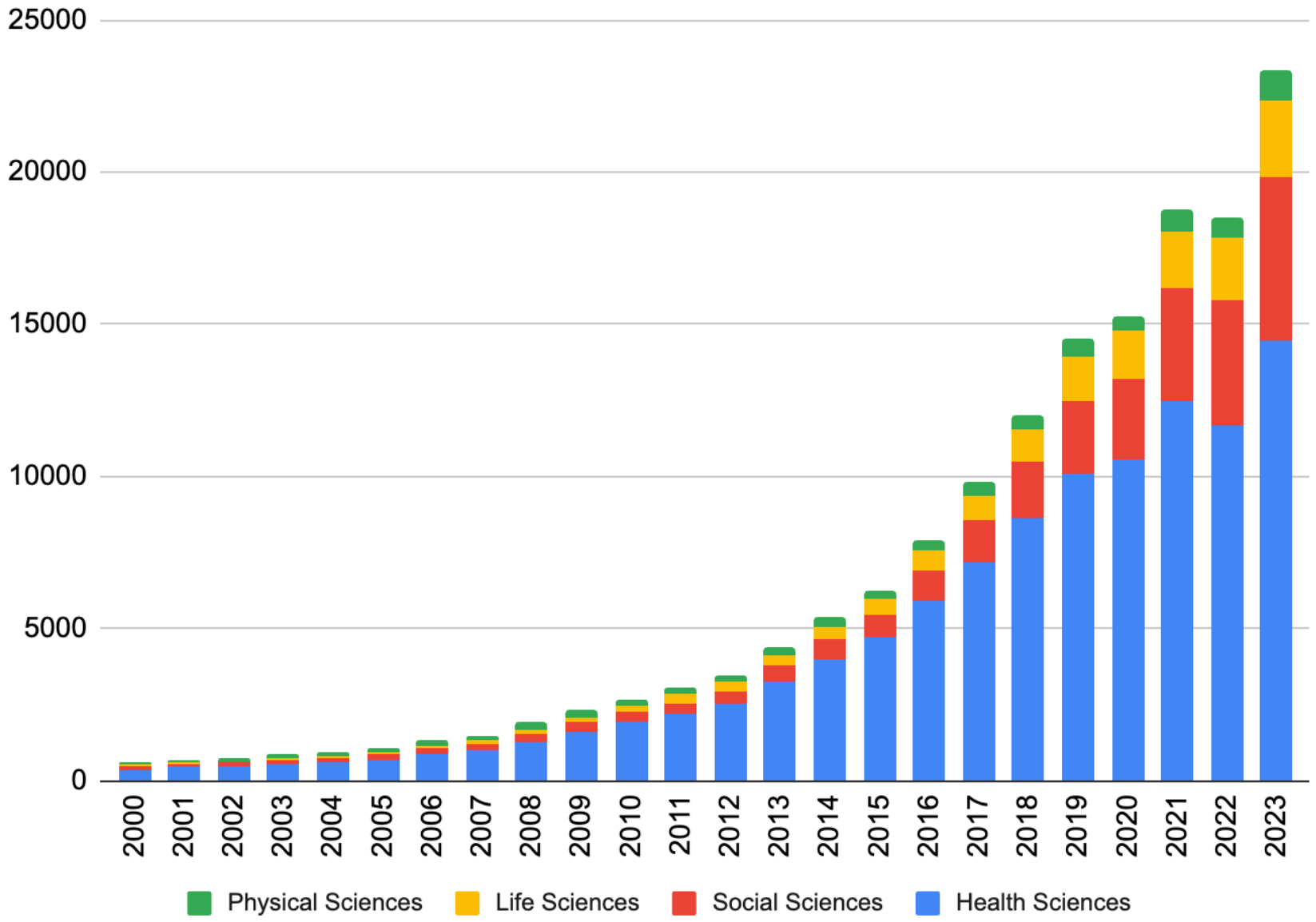
Make it Normative & Rewarding

Make it Required

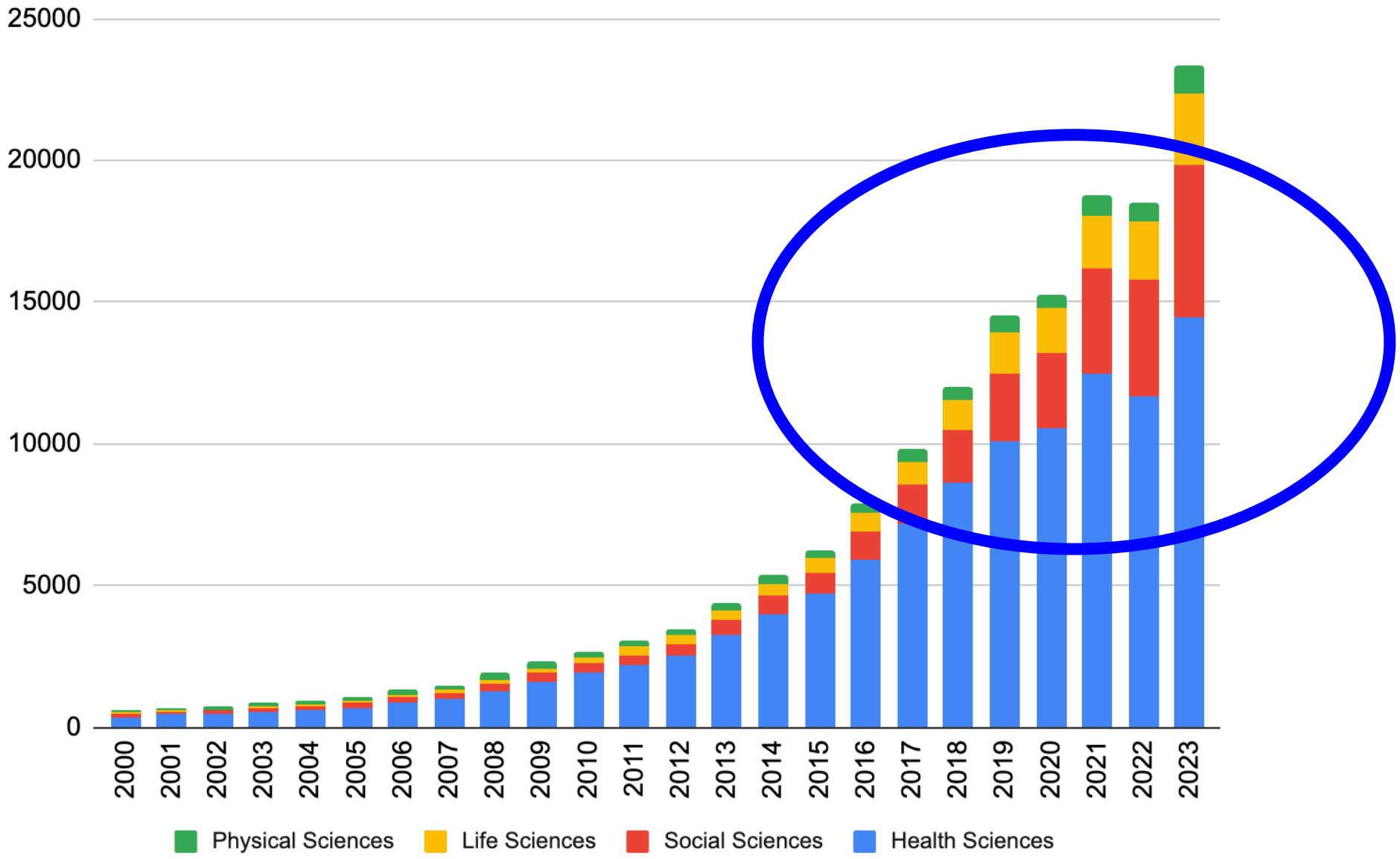
Example: Preregistration

Increasing reproducibility by reducing QRPs and improving transparency

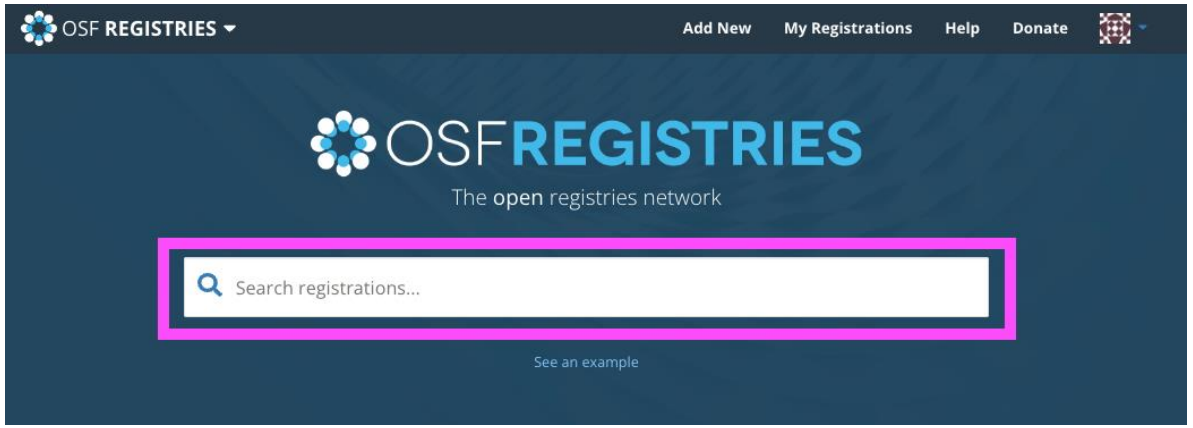
Growth in Papers Mentioning (Pre)registration Over Time



Accelerated Adoption in the Social Sciences



Make it Possible

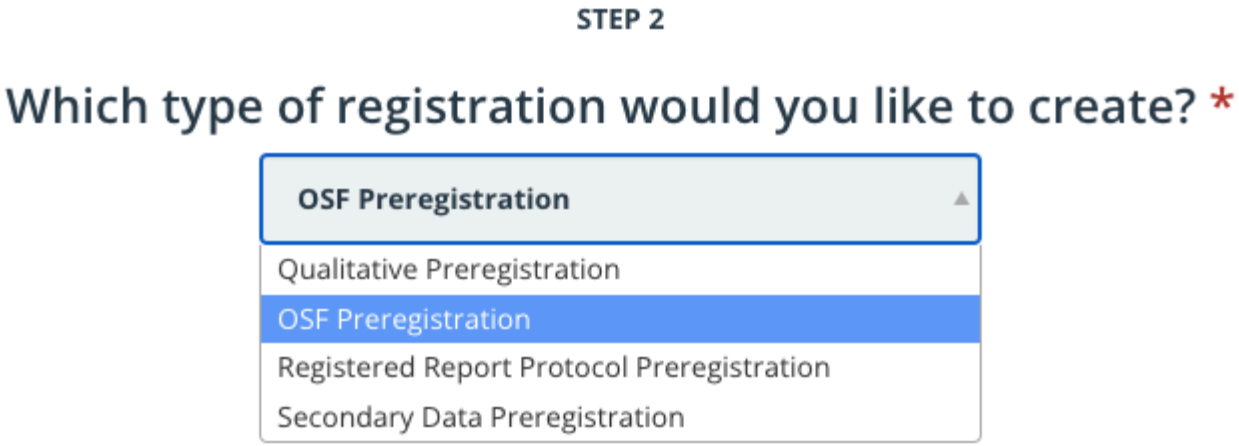


3ie RIDIE
Registry for International Development Impact Evaluations

Registry of Efficacy and Effectiveness Studies

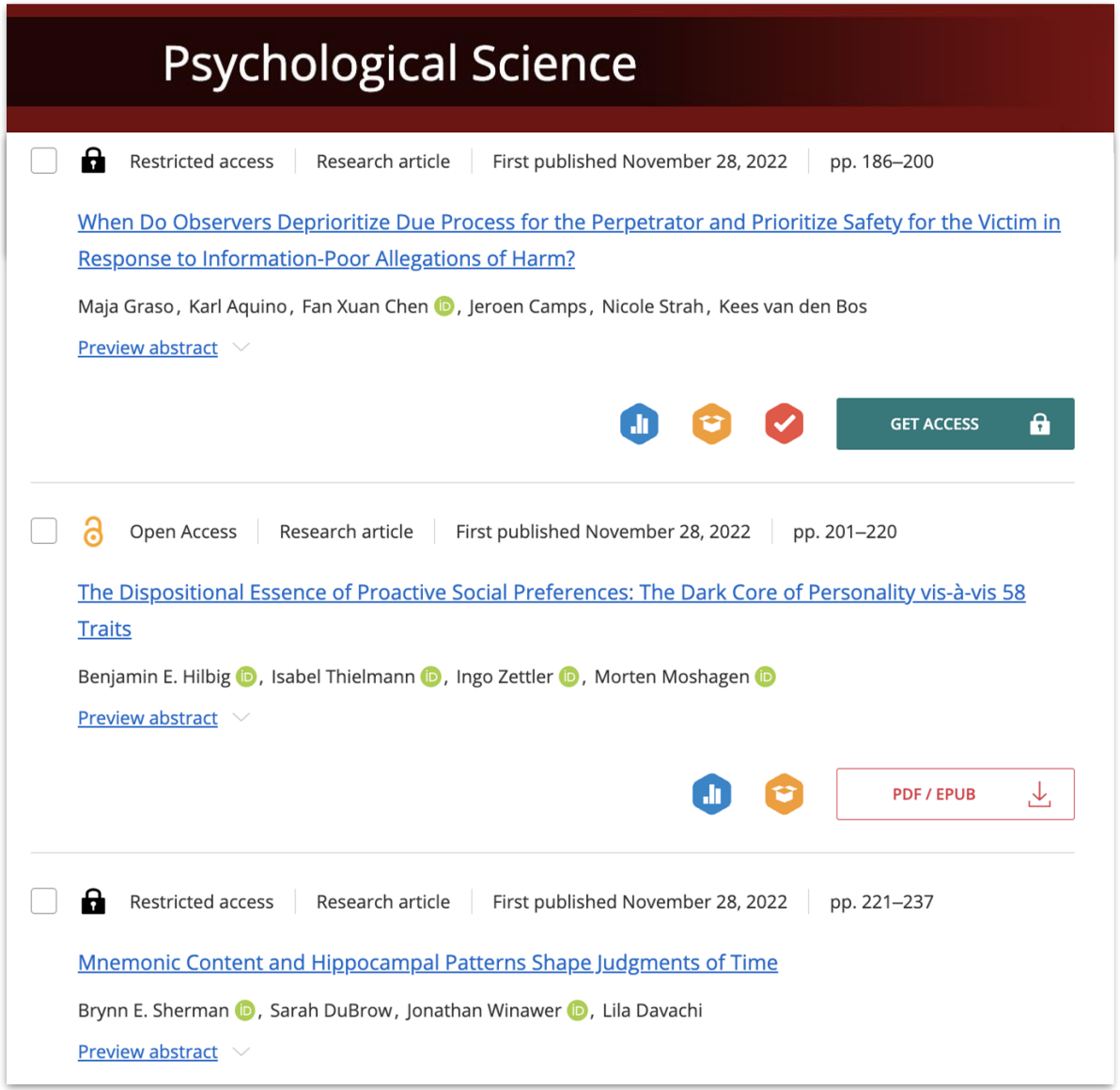
AS PREDICTED

Make it Easy

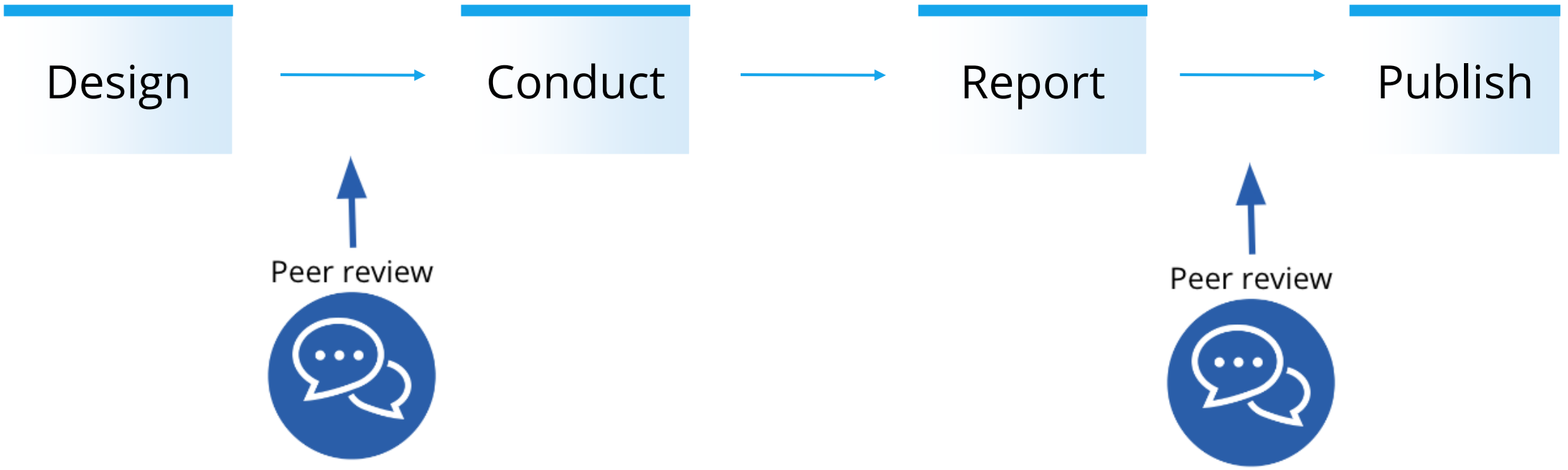


Template	Description
OSF Preregistration	Standard, comprehensive, and general purpose preregistration form. Most commonly used.
Open-Ended Registration	Most flexible template. Only use if another template doesn't fit your study design or registering a completed project.
Generalized Systematic Review	For preregistering systematic reviews, scoping reviews, and meta-analyses
OSF-Standard Pre-Data Collection Registration	State whether data have been collected or viewed and other pertinent comments. Use this one if your pre-analysis plan is uploaded on OSF as a doc
Pre-Registration in Social Psychology	Preregister a research study outlining the hypotheses, methods, and analysis plan
Preregistration Template from AsPredicted.org	Eight questions derived from content recommended by AsPredicted.Org.
Qualitative Preregistration	Template for registering primarily qualitative work
Registered Report Protocol Preregistration	Register your protocol AFTER having been given "in-principle acceptance" from a Registered Report journal
Replication Recipe (Brandt et al., 2013): Post-Completion	Register a replication study after it has been conducted with questions regarding the outcomes of the replication.
Replication Recipe (Brandt et al., 2013): Pre-Registration	Register a replication study with a series of questions regarding the original work.
Secondary Data Preregistration	For preregistering a research project that uses an existing dataset.

Make it Normative

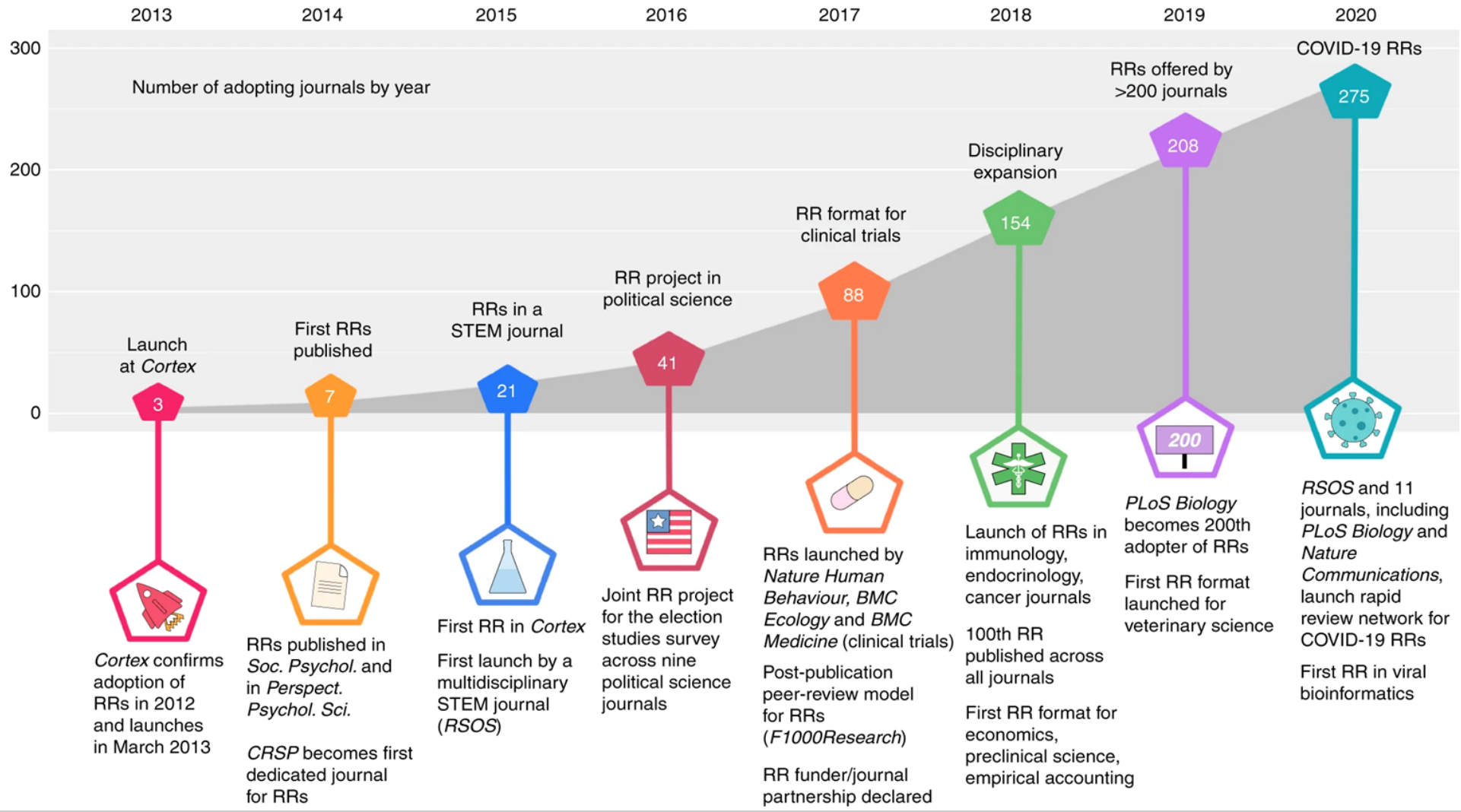


Make it Rewarding



http://cos.io/rr, Committee Chair: Chris Chambers. Nosek & Lakens, 2014

Make it Rewarding



Chambers & Tzavella, 2021

Make it Required

Arnold Ventures

Arnold Ventures' Approach to Funding Research

We work to ensure the accuracy and independence of our research by requiring:

- ✔ preregistration
- ✔ open data
- ✔ open code
- ✔ full transparency about methods and results

https://www.arnoldventures.org/work/research

Global Flourishing Study

Data from the first wave is now available for those who have preregistered their analysis plans or are planning a Registered Report with an eligible journal. Each subsequent wave will be available approximately one year later.

https://globalflourishingstudy.com/

Factors Affecting Preregistration Adoption

Technical

Suboptimal discoverability & linking

Alignment between preregistration and paper

Lack of key metadata

And so on...

Social

Uncertainty about cost and benefits

Fear of others gaining productive advantage

Changes order of work

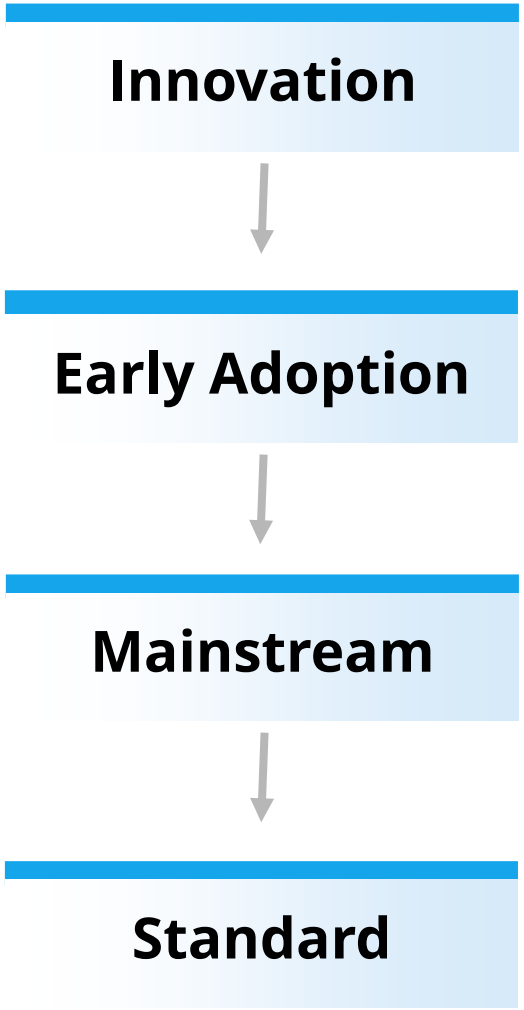
And so on..

Logg & Dorison, 2021

Factors influencing preregistration adoption

Relative advantage	Low awareness of benefits
Compatibility	Change in order of work
Complexity	Deviations & linking
Trialability	Perceived lack of productivity
Observability	Low discoverability, metadata

Implementation Strategy for Scaling & Sustaining



Make it Possible

INFRASTRUCTURE, TOOLS, PROCESSES

Make it Easy

RESEARCHER-CENTRIC, INTEGRATED SOLUTIONS

Make it Normative & Rewarding

COMMUNITY-BUILDING, TRAINING, INCENTIVES

Make it Required

POLICY REFORM AND IMPLEMENTATION

Thank you

These slides: https://osf.io/hnckv
Me: tim@cos.io

Celebrating rigor, reproducibility, and transparency in research

The €500,000 Einstein Foundation Award for Promoting Quality in Research is the first ever recognition and funding for outstanding efforts and innovative ideas fostering responsible and reliable research. You are invited to nominate those who tirelessly work towards this goal or to apply to win the much-needed funding for your innovative ideas.

The call is open annually from January to April.

https://award.einsteinfoundation.de/