

*How open science
practices increase the
public value and
legitimacy of scientific
research*

@ArthurLupia

Assistant Director, NSF



Today's Priorities



GRATITUDE



COMMUNITY



HEALTH

Today's Priorities



GRATITUDE



COMMUNITY



HEALTH



Thank you for your service
to others.



Science as service



PRE-DECISIONAL - PROPRIETARY

22



Science as a basis of innovation



- Why should we **pay** for what you do?
- Why should we **trust** what you do?

Open Science

1. Access to research workflows.
2. Access to research products

Access to workflows



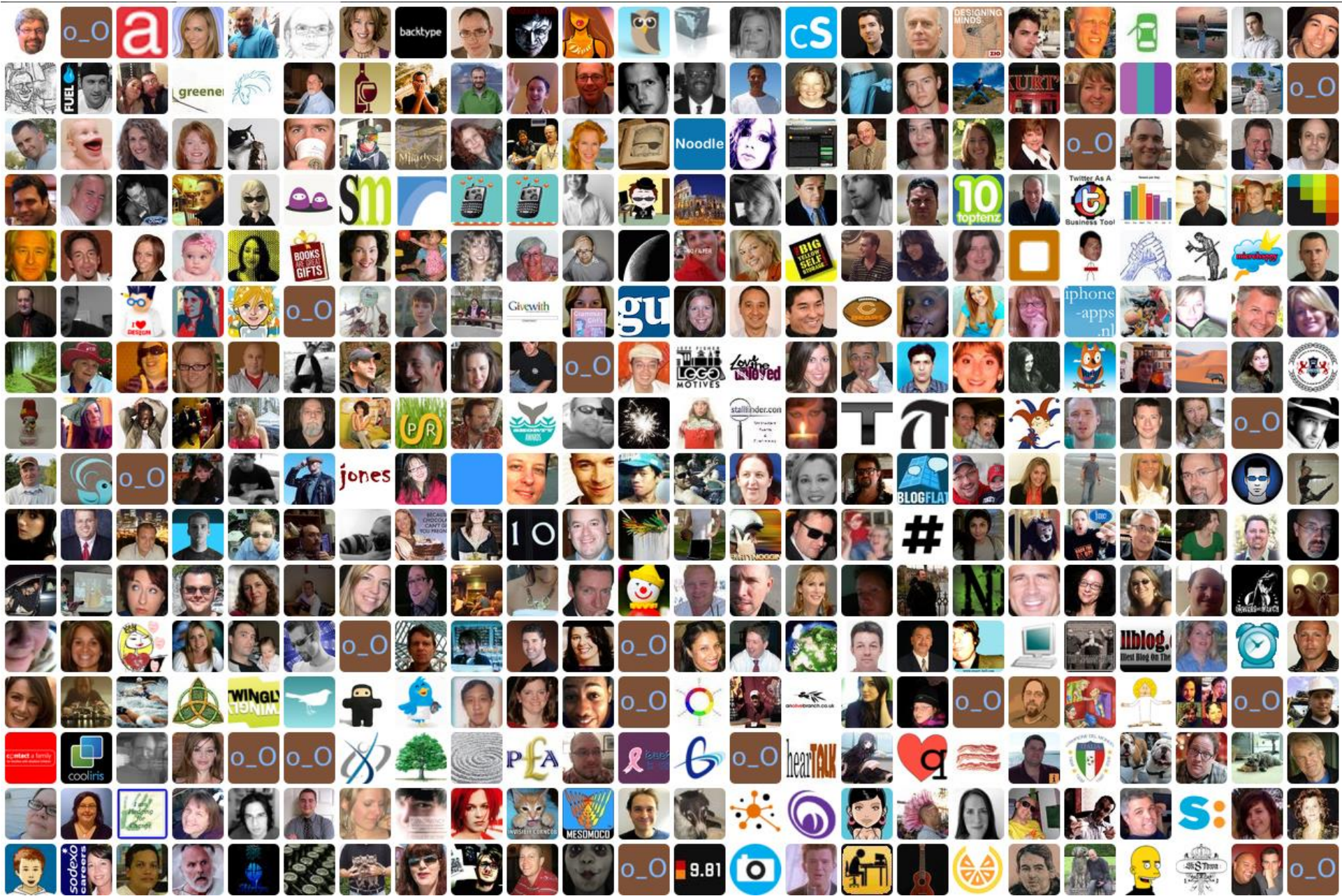
What is the **value** of
our work?

Decisions rely on

evaluations

of past actions.

evaluations



Which evaluations
do people believe?

Evaluation Criteria

- **CREDIBLE**

- the quality of being believable or trustworthy

- **LEGITIMATE**

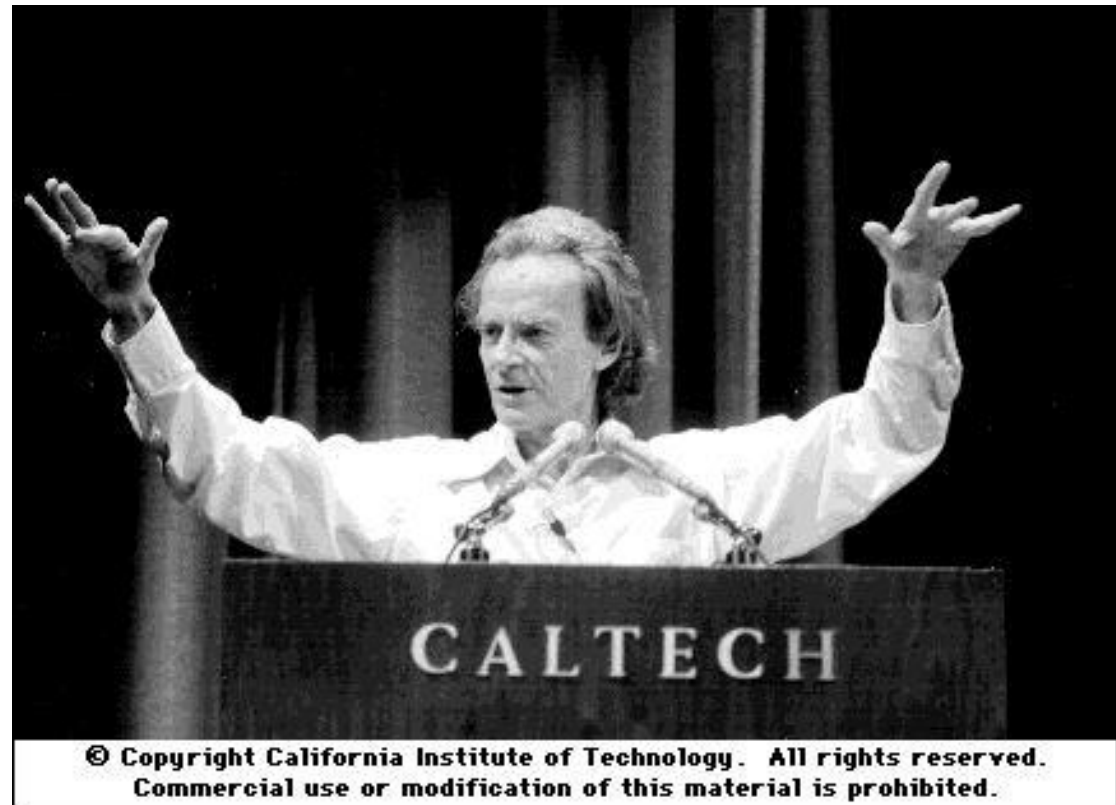
- in accordance with recognized or accepted standards or principles

What is the value of our work?

It is a potential source of
credible and legitimate evaluations.

- Richard Feynman (1974 – Caltech Commencement Address)

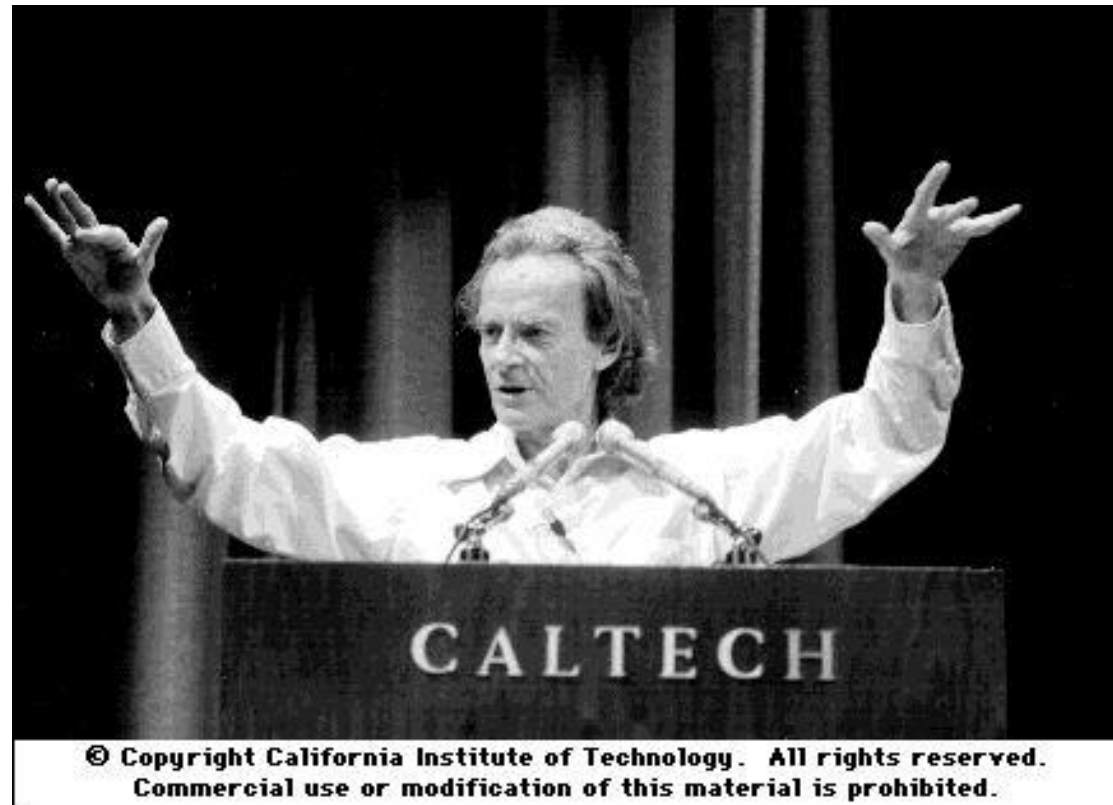
“[Scientific integrity] corresponds to a kind of **utter honesty**—a kind of leaning over backwards....



© Copyright California Institute of Technology. All rights reserved.
Commercial use or modification of this material is prohibited.

- Richard Feynman (1974 – Caltech Commencement Address)

“...the idea is **to give all of the information** to help others judge the value of your contribution; **not just the information that leads to judgment in one particular direction...**”



© Copyright California Institute of Technology. All rights reserved.
Commercial use or modification of this material is prohibited.

Is the *potential* realized?



Today, many researchers have...

- Strong incentives to discover and publish
- **Weak** incentives to explain how the discoveries emerged.

Academic Advancement Ecosystem

- Salary
- Health Insurance
- Grants
- Offices
- Air Conditioning
- Buildings
- Scholarships
- Money for Conferences
- Money for field work

- Prestige
- Bragging rights
- “publications”
- And so much more...



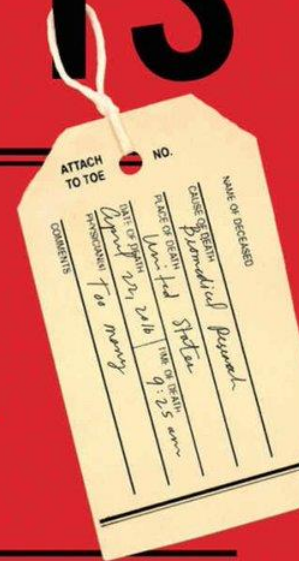
Current practices threaten...

- the meaning of individual studies
- the meaning of scientific consensus

RIGOR MORTIS

*HOW SLOPPY SCIENCE
CREATES WORTHLESS
CURES, CRUSHES HOPE,
AND WASTES BILLIONS*

RICHARD HARRIS



Greater Transparency Means Clarity about



HOW WE CHOSE
WHAT TO OBSERVE.



HOW WE CHOSE TO
RECORD WHAT WE
OBSERVED.



HOW WE CHOSE TO
CATEGORIZE WHAT
WE RECORDED.



HOW WE CHOSE TO
ANALYZE WHAT WE
CATEGORIZED.



HOW WE CHOSE TO
INTERPRET WHAT
WE ANALYZED.



HOW WE COULD BE
WRONG.

What is the value of our work?

It is a potential source of
credible and legitimate evaluations.

Access to
products



Objective

- Can we increase the public value of research through greater availability of...
 - Publications
 - Data
 - Code
 - Related materials

Make it FAIR

Findability

Accessibility

Interoperability

Reusability

NSF Access to Products

- Public Access Repository (PAR)
 - 75k articles deposited
 - 93% available without embargo
 - Deposit rates up 230%/year for last four years.
- March '20 pilot: Make PAR 2.0 more responsive & easier to use.
- Dear Colleague Letter: Effective Practices for Data
 - Persistent IDs for Data
 - Machine-Readable DMPs



US Agencies are Coordinating on...

- Desired Repository Standards
- Desired Metadata Characteristics
- Desired Data Management Plan Characteristics
- Desired Attributes of Digital Identifiers
- Shared principles for data access

The Role of Informatics

Evidence and causal analysis:
What works best to increase
the public value of research?

Infstratructure: Can we make
it easy for people to access
and use?

It's Up to Us

- Open science can help us create legitimacy and public value.
- Achieving these outcomes requires incentives and infrastructure.



Thank you for
your service to
science &
society.

@ArthurLupia